Royal Geographical Society of
Australasia. South Australian Branch
Proceedings
1906/07

G
51
R87
1906/07

PROCEEDINGS

OF THE

Royal Geographical Society

OF

Australasia:

SOUTH AUSTRALIAN BRANCH.

SESSION 1906-7.

VOL. IX.

The Council desire it to be understood that in giving publicity to the Papers read before the Society they accept no responsibility for opinions or statements expressed therein.

ADELAIDE:
VARDON & SONS, PRINTERS, GRESHAM STREET.
1907.

The Royal Geographical Society of Australasia.

The object of this Society is to diffuse a knowledge of Geographical Science, the study of Physical Geography, and especially to encourage and promote the Geographical Exploration of the unknown and imperfectly known parts of Australia:

1. By Lectures given during the winter months by its own members or by others competent to speak with authority on the subjects considered;
2. By the collection in its Library of Geographical Literature from all parts of the globe;
3. By the publication from time to time of its Proceedings, containing Reports of the principal Lectures.

This Society has recently acquired by purchase the world-renowned collection of Geographical, Historical, and Scientific books, known as the "*York Gate Library*," which will shortly be arranged in the new rooms of the Society, especially built for the purpose, in the Institute Building, North-terrace.

The annual fee of 10s. 6d. entitles a Member of the Society to daily access to this valuable Library, which will be open on week days only.

As no charge is made to the public for admission to the Lectures, and there are considerable expenses in carrying on the operations of the Society, the Council earnestly ask for the interest and co-operation of the public, who can effectively forward the general aims of the Society by becoming Members.

Institute Building,
North Terrace,
Adelaide.

PROCEEDINGS

OF THE

Royal Geographical Society

OF

Australasia:

SOUTH AUSTRALIAN BRANCH.

SESSION 1906-7.

VOL. IX.

The Council desire it to be understood that in giving publicity to the
Papers read before the Society they accept no responsibility
for opinions or statements expressed therein.

ADELAIDE:
Vardon & Sons, Printers, Gresham Street.
1907.

LIBRARY
FEB 14 1967
UNIVERSITY OF TORONTO

G
51
R87
1906/07

CONTENTS.

Page

Arctic Explorations ... ... xxi.

Antarctic Explorations ... ... xxii.

Antarctic Country Two Hundred Years Ago ... 38

Annual Meeting—President's Address ... ... xix.

Australia Two Hundred Years Ago 35

Australian Pioneers following Flinders and Brown, by J. H. Maiden, F.L.S. 31

Building, New, Opening of ... ...

Council Meetings, 1906-7 ... ... vii.

Council and Members, List of ... ... v.

Davenport, Sir S., Death of ... ... xx.

Davenport, Sir S., Presentation of Bust ... ... xx.

Empire League, Photographs Supplied to ... ... xi.

Explorations—South Australian, Arctic, Antarctic, Asia, Africa, America ... ... xxi.

Epidiascope ... ... xiv.

Flinders Tablet, Disfigurement of ... ... xiii.

Frenchman's Rock, Hog Bay, Protecting Shelter of... x.

Library and Museum, Additions to ... ... xv.

Light, Colonel, Unveiling of ... ... xx.

Papers:

Coral Islands, Reefs, and Atolls, by A. W. Dobbie, Esq., J.P. 1

Primeval Man and His Companions, by T. S. Reed, J.P. 17

Magarey, A. T., Late ... ... vii.

Sturt, Captain, Proposed Statue to ... ... xx.

Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

http://www.archive.org/details/austrproceedings09royauoft

Royal Geographical Society of Australasia.

SOUTH AUSTRALIAN BRANCH.

Patron:

His Excellency the Governor, Sir George Le Hunte, K.C.M.G.

LIST OF MEMBERS.

Council:

The Honorable Sir J. Langdon Bonython, J.P., President.
Wm. Birkinshaw Wilkinson, J.P., Vice-President.

Newland, Simpson, J.P.
Thomas, Robt. Kyffin, J.P.
Auld, Wm. P.
Simpson, A. M., J.P.
Piper, A. W.
Eitel, Rev. Dr., M.A., Ph.D.
Whitham, Chas. L.
Dobbie, A. W., J.P.
Bakewell, E. H., J.P.

Thos. Gill, I.S.O., J.P., Hon. Treasurer.

Newman, E. H., LL.B.
Sanders, C. J. } Joint Hon. Secretaries.

Reed, Thos. S., J.P., Secretary.

Life Members:

Verco, Joseph, Dr., M.D.
Wells, L. A.
Wilcox, Geo.
Rymill, Henry, J.P.
Scarfe, Thomas Roger
Goode, Charles Henry, J.P.
Darling, John, J.P.
Gordon, John
Bonython, Sir J. Langdon, J.P.
Simpson, Alfred Mueller, J.P.
Scott, Henry, J.P.
Smith, Richard, J.P.
Smith, Robert Barr, J.P.
Thomas, Robert Kyffin, J.P.

Honorary Members:

Auld, Wm. P.
Thring, Wm.
King, Stephen
Billiatt, J. W.
Lindsay, D.
Tietkens, W. H., F.R.G.S.
Harris, Chas. Hope
Maurice, R. T.
Murray, W. R.

Members:

Acraman, John
Adamson, Adam, J.P.
Aldridge, G. S.
Anderson, J. M., J.P.
Angas, Chas. H., J.P.
Angus, Professor W.
Auld, Wm. P.
Bagshaw, J. A., J.P.
Bakewell, J. W., J.P.
Bakewell, Leonard
Bakewell, E. H., J.P.
Barker, T., J.P.
Barker, W.
Benda, F. E., J.P.
Bonython, Sir J. Langdon, J.P
Bonython, L.
Bowman, T. R., J.P.
Brocksopp, W. J.
Brunskill, G., J.P.
Brookman, Hon. Geo., M.L.C.

Brown, H. Y. L., F.G.S.
Brown, Tom L.
Brown, Lady
Bruce, Theodore, J.P.
Buchanan, A., S.M.
Chambers, W.
Charlick, Wm., J.P.
Counsell, J.
Crawford, R. H., J.P.
Creswell, J. J.P.
Dalton, W. E.
Davenport, Howard
Davies, Edwd.
Dobbie, A. W., J.P.
Downer, A. G., J.P.
Duncan, Hon. J. J., M.L.C.
Eitel, Rev. Dr., M.A., Ph.D.
Fisher, Joseph, J.P.
Fisher, Harold
Gall, T. B.
Gartrell, Jas., J.P.
George, Miss
Giles, F. W.
Gill, Thos., I.S.O., J.P.
Gill, Harry P.
Girdlestone, Rev. H., M.A.
Gooch, Walter, J.P.
Goode, M.
Goode, C. H., J.P.
Gordon, Jno.
Gordon, Jas., P.M.
Graves, H.
Greenwood, W. B.
Hamilton, Dr. W. C.
Hamilton, Dr. T. K.
Harris, Charles Hope
Hardy, Jno., J.P.
Harvey, Jas., J.P.
Hawker, E. W., J.P.
Hawkes, G. W., J.P.
Holden, J. H., J.P.
Honeywill, W.
Holtze, M. J., F.L.S.
James, Dr. Thos., J.P.
Jones, J. W., J.P.
Joyner, E. V., J.P.
Jury, G. A.
Knill, E. A.
Lewis, Hon. Jno., M.L.C.
Lendon, A. A., M.D., M.R.C.S.
Limbert, E. H., LL.B.
Lloyd, J. Sanderson
Magarey, T. C.
Magarey, W. A.
Marten, Dr. H.
Martin, Alex.
Mayo, Geo. Gibbes., J.P.
Milne, Geo.
Mrs. W. Milne
Moore, H. P., J.P.
Mudie, H. M.
Muecke, Hon. H. C. E., M.L.C.
Murray, J. G. R.
Newland, Simpson, J.P.
Newman, E. H., LL.B.
Neill, A. S., J.P.
Parsons, H. A., LL.B.
Phillipps, W. Herbert
Piper, A. W.
Poole, Wm. B., J.P.
Porter, W. H. R.
Pope, W.
Riddoch, Hon. Geo., M.L.C.
Rieschbeth, C. F.
Roach, B. S.
Rogers, Dr., R.S.
Russell, Wm.
Sanders, C. J.
Sanderson, J. V.
Scott, Henry, J.P.
Scott, W. C.
Sholl, L. H., I.S.O., J.P.
Simpson, A. M., J.P.
Simpson, A. A.
Smith, R. Barr, J.P.
Smith, Sir E. T., K.C.M.G., J.P.
Smith, Tom Barr
Smith, E. M., J.P.
Snow, F. H., J.P.
Sowden, W. J., J.P.
Stacy, W. T.
Stewart, Graham
Stirling, Professor E. C., C.M.G., M.D., F.R.S.
Stone, C.
Strawbridge, W., I.S.O., J.P.
Tepper, J. G. O.
Thomas, Robert Kyffin, J.P.
Thomas, Right Rev., A.N., D.D., Bishop of Adelaide
Thomas, J. Edwin, J.P.
Thomas, E. Kyffin
Todd, C. E., M.D., L.R.C.P., M.R.C.S., J.P.
Toms, S.
Verco, Dr. Joseph, M.D.
Vicars, Jas.
Van Senden, E. W.
Wallis, F. S., M.L.C., J.P.
Waterhouse, H. B.
Ware, W. L., J.P.
Way, Rt. Hon. Sir Saml., Bart.
Whitham, C. L.
Wilkinson, W. B., J.P.
Wood, Peter

PROCEEDINGS

OF THE

Royal Geographical Society of Australasia

(SOUTH AUSTRALIAN BRANCH).

TWENTIETH SESSION, 1906-7.

Council Meetings.

JUNE 22, 1906.

A special meeting was called owing to the sudden death of Mr. A. T. Magarey, which occurred two days previously.

Present—Sir Langdon Bonython (President), Mr. W. B. Wilkinson (Vice-President), Rev. Dr. E. J. Eitel, Messrs. R. K. Thomas, E. H. Bakewell, W. P. Auld, A. W. Dobbie, A. W. Piper, A. M. Simpson, T. S. Reed (Secretary). Mr. Thomas Gill (Treasurer) and Mr. E. H. Newman, L.L.B. (Hon. Secretary) were unavoidably prevented from attending.

The President said when he saw the announcement in the Melbourne papers that Mr. A. T. Magarey was dead it came as a great shock, and when he received a telegram suggesting that a special meeting of the Council should be held in connection with the sad event he cordially approved, and decided to leave Melbourne to attend it. The full attendance of members that morning was most gratifying to him personally, and was a very striking tribute to the esteem in which Mr. Magarey was held. He was certainly in all the relations of life a most exemplary citizen. He never spared himself in his efforts to promote the well-being of the community. His industry was untiring, and his enthusiasm in every good cause unfailing. But they, as a council, specially thought of him as associated with the Geographical Society. He was one of its founders, and it never had a more energetic worker. For many years he had been one of the honorary secretaries, and his service was of the most generous sort. He took the keenest interest in exploration, was an encyclopædia of information in regard to the habits and customs of the aboriginal natives, and, with others, did excellent work in the erection of permanent memorials to preserve in the minds of the people the memory of interesting events in the history of South Australia. They would long miss Mr. Magarey's cordial greeting and his genuine friendship, but it was a source of satisfaction to know that, although he had passed from them, his life would continue to be an inspiration in the direction of noble aims and wholehearted service in the public interests.

The sentiments of the President were warmly endorsed by the other members of the Council. On the motion of Mr. Wilkinson (Vice-President), seconded by Mr. Auld, the following resolution was carried: "That the Council of the Royal Geographical Society (South Australia) deeply deplores the death of Mr. A. T. Magarey, one of the Hon. Secretaries and a founder of the Society, and that a letter of condolence be written to Mrs. Magarey expressing the deep sympathy of the members of the Council in her sad bereavement." It was reported that arrangements had been made for sending a wreath, and the meeting deputed the President and Mr. Thomas (ex-President) to attend the funeral on behalf of the Council. They were present later in the day with a large number of mourners at the interment, which took place at the Stirling East Cemetery. It is a beautifully-situated "God's Acre," and forms a fitting resting-place for the remains of one who loved nature everywhere, but specially as disclosed in our hill country.

It may be mentioned here that the preliminary meeting of the Society was held on the 10th July, 1885, in the Town Hall. Amongst those present who have passed over to the great majority were Sir Henry Ayers, Sir Thomas Elder, Hon. G. W. Cotton, Hon. F. E. H. Krichauff, Very Rev. Archdeacon Farr, Mr. W. Bundey (then Mayor of Adelaide), Colonel Egerton Warburton, Hon. S. Tomkinson, Mr. W. Everard, Mr. T. Evans, jun., Mr. J. A. Hartley (Inspector-General of Schools), Mr. T. Worsnop (Town Clerk of Adelaide), and Rev. F. Williams (Head Master of St. Peter's College). At the first general meeting of the Society, which was held at the close of the preliminary meeting, the following officers were elected:—Vice-President, Sir Samuel Davenport; Provisional Council, Sir Thomas Elder, Mr. G. W. Goyder (Surveyor-General), Hon. R. A. Tarlton, Hon. F. E. H. Krichauff, Mr. C. Hope Harris, Mr. W. B. Wilkinson: Treasurer, Mr. Thomas Gill; Hon. Secretaries, Mr. J. W. Jones, Mr. A. T. Magarey. Of those who were appointed on the first Council in 1885, the only active members of the Council to-day are the Vice-President, Mr. W. B. Wilkinson, and the Treasurer, Mr. Thomas Gill.

JULY 13, 1906.

Present—Sir Langdon Bonython (President), Mr. W. B. Wilkinson (Vice-President), Rev. Dr. Eitel, A. W. Dobbie, W. P. Auld, T. Gill, E. H. Newman, and T. S. Reed (Secretary).

An invitation was read to an International Geological Convention to be held in Mexico in September.

Reply to be sent that if a representative could attend, the Society would be glad to be represented.

A circular was read from the Prince of Monaco suggesting an International Oceanographical Congress. A reply to be sent that the Society cordially approved of the suggestion, that it was unlikely that any representative could attend, but the Society would be glad to be represented if possible.

A letter was read from Mrs. A. T. Magarey acknowledging the expressions of sympathy of the Society in her bereavement.

Resolved that Mr. C. J. Sanders be appointed one of the Honorary Secretaries in place of the late Mr. Magarey.

Mr. Thos. Gill mentioned that the name of Hergott and Warrina were incorrectly spelt in the maps, and should be Hergolt and Warrener respectively, the towns being named after two members of Babbage's Exploring Expedition. It was decided to inform the Government of the matter. It was also decided that a book recording such and other matters of interest should be kept by the Society.

Mr. T. Gill stated that he had been granted access to the log-book of H.M.S. "Dart" in the Record Office, Sydney, which had never been published, and suggesting that extracts be included in the next Vol. of Proceedings. The suggestion was adopted, and Mr. Gill was asked to write a preface to it. (This was published in Vol. VIII.)

Tenders for printing Vol. VIII. of the Proceedings were read, and it was resolved to accept that of Messrs. Vardon and Pritchard.

Mr. T. Gill presented some charts and maps of the English and Welsh counties.

Secretary reported that Mr. A. W. Dobbie had delivered his lecture on May 18, and that Mr. T. S. Reed had also lectured on June 25, both lectures being largely attended.

SEPTEMBER 17, 1906.

Present—Sir Langdon Bonython (President), Mr. W. B. Wilkinson (Vice-President), Rev. Dr. Eitel, Messrs. S. Newland, E. H. Bakewell, A. W. Dobbie, A. W. Piper, T. Gill, E. H. Newman, and T. S. Reed (Secretary).

An announcement was received from the Geographical Society, Tokio, that their Vice-President and principal founder, Monsr. Le Viconte Nagoka, had recently died. It was resolved that a letter be written expressing the sincere regret and sympathy of the Council.

A letter was read from Mr. E. J. Bradley asking this Society to co-operate with other scientific societies in Adelaide in procuring an epidiascope, and to appoint a delegate to act with delegates of the other societies. It was resolved to accede to the request, and Mr. T. Gill was appointed delegate.

An invitation to a Congress for the study of the Polar Regions, to be held in Brussels in September, 1906, was read, and it was decided to reply that the Society heartily approved of the Congress, and would have been glad to have been represented had it been possible.

An invitation was read asking for the co-operation of the Society at a proposed International Maritime Exposition at Bordeaux in 1907. A letter to be written that the Council approved of the objects, but it was unlikely it would be able to be represented.

A letter was read from Mrs. Bertha Stow, stating that a protecting shelter had been placed over "Frenchman's Rock," Hog Bay, with the assistance of the Government, and that a stone cairn had also been erected on Kangaroo Head, Kangaroo Island, to commemorate the landing of Captain Flinders there. A letter to be written congratulating the committee and the people of the district generally on the success of their efforts.

The Treasurer reported that Messrs. H. Graves & Co. had conveyed the whole of the cases of the York Gate Library from Port Adelaide to Adelaide without charge. A letter of thanks to be sent, and it was resolved to elect Mr. Henry Graves, the principal of the firm, a member of the Society, as an expression of its appreciation, and to credit the amount chargeable, £1 9s. 2d., to this and following year's subscription.

The Secretary was directed to write Messrs. Elder, Smith, and Co., and again thank them for their kindness in shipping the York Gate Library from London free of charge.

A photograph of the late Mr. A. T. Magarey was received from his widow, and the Council directed that it should be framed and hung in the room of the Society.

Mr. Reed reported that at the request of the President he had attended a meeting convened by the Empire League, and had submitted a list of names for portraits of notable persons, founders, pioneers, explorers, &c., connected with the history of this State.

The Secretary reported the death of Sir Samuel Davenport, K.C.M.G., the first President of the Society, and that members of the Council represented the Society at his funeral. It was resolved that a letter of condolence be sent to his relatives, and that a minute be made recording the appreciation of the work Sir Samuel had done for the Society, and the interest he had taken in promoting its objects and welfare.

Mr. T. Gill presented a number of valuable books, maps, and charts, and a resolution expressing the thanks and appreciation of the Council of Mr. Gill's deep interest in the Society were passed.

OCTOBER 29, 1906.

Present—Sir Langdon Bonython (President), Rev. Dr. E. J. Eitel, Messrs. S. Newland, R. K. Thomas, E. H. Bakewell, A. M. Simpson, T. Gill, and E. H. Newman.

A letter was read from Mr. A. Saupe offering to execute a bust or medallion of the late Sir Samuel Davenport. Resolved that the Society will be willing to take one medallion of £6 6s. provided the work is executed to the satisfaction of Sir Samuel's relatives.

Resolved that the Council strongly recommends for the favorable consideration of the Government of this State the desirableness of acknowledging in an appropriate manner their sense of the geographical value of the results of small exploration parties when the results are accompanied by maps and diaries, kept during the explorations of country hitherto unmapped or unknown; and particularly for explorations in desert or unfertile country which involve greater risks and hardships. Resolved that the Council also strongly urges upon the Government the continuance of the former practice of printing and publishing Parliamentary Papers and in other form all diaries and maps as soon as possible after such documents have been placed in the hands of the Government, in order that the discoveries be made available to the public generally.

Resolved that the Government be recommended to pay Captain H. V. Barclay at least £150, in recognition of his recent work in exploring and mapping parts of Central Australia.

MARCH 18, 1907.

Present—Sir Langdon Bonython (President), Mr. W. B. Wilkinson (Vice-President), Rev. Dr. E. J. Eitel, Messrs. R. K. Thomas, A. W. Piper, A. M. Simpson, C. L. Whitham, W. P. Auld, T. Gill, C. J. Sanders, E. H. Newman, and T. S. Reed (Secretary).

A letter was read from the Commissioner of Crown Lands stating that the Government could not make the grant to Captain H. V. Barclay that the Council had requested. It was decided to again urge the Government to comply with the Council's request, and that a letter be sent accordingly.

A letter was read from the Geographical Society of Russia asking this Society to honor them with its congratulations to their Vice-President, Monsieur Mons. Pierre de Semenoo, on attaining the 80th anniversary of his birthday. It was decided to accede to the request.

A letter was read from Mr. Howard Davenport offering to present to the Society a bust of the late Sir Samuel Davenport, and the Secretary reported that he had accepted the offer, and that the bust had since been sent, and was now placed upon the table before the meeting.

It was resolved that the cordial thanks of the Society be presented to Mr. Davenport, and that he be informed that the bust should be placed in a prominent position in the Society's new building.

A letter was read from the Town Clerk of Adelaide, stating that at a recent meeting a committee had been formed to obtain funds for the erection of a statue to Captain Sturt, and this Society had been asked to nominate a member. Mr. W. B. Wilkinson was elected as the representative.

The Honorary Treasurer reminded the Council of the movement to secure an epidiascope, and that a contribution would be sought from the Society. The matter was referred to the Hon. Treasurer to report at the next meeting.

The President was granted leave of absence *re* account of his approaching departure for England, and it was resolved that he be thanked for his services as President, and that a letter of commendation to the Royal Geographical Society, London, be given to him, and that he be requested personally to convey the thanks of the Society to Dr. Scott Keltie, the Secretary of the Royal Geographical Society, for the assistance he had given when the York Gate Library was purchased.

MARCH 27, 1907.

Present—Sir Langdon Bonython (President), Mr. W. B. Wilkinson (Vice-President), Messrs. S. Newland, E. H. Bakewell, A. W. Piper, A. W. Dobbie, A. M. Simpson, C. J. Sanders, T. Gill, E. H. Newman, and T. S. Reed (Secretary).

Resolved that arrangements be made by the Society with the Royal Society, the Society of Arts, and the Photographic Society for an opening ceremony on the completion of the new building erected for this and the other Societies.

It was further resolved that it be suggested to the other Societies that each Society appoint a committee of two, and that the committees confer with regard to such arrangements, and that Messrs. Wilkinson and Gill be the committee of this Society.

Resolved that having regard to the value of the York Gate Library, the Government be asked if the new building in which the Library will be placed will be fire-proof, and if it will not, then that the Government be urged to make it fire-proof, and for that purpose to adopt ferro-concrete floors in its construction.

MAY 15, 1907.

Present—Mr. W. B. Wilkinson (Vice-President), Messrs. R. K. Thomas, W. P. Auld, A. W. Dobbie, C. S. Whitham, A. M. Simpson, A. W. Piper, T. Gill, E. H. Newman, and T. S. Reed (Secretary).

A letter was read from Miss Muriel Parsons, stating that on a recent visit to Rosetta Head, she had noticed that names had been scratched on the Flinders Tablet.

The Secretary reported that he had communicated with the Commissioner of Police, and that a report was received from his office stating that he had endeavoured to trace the offenders, but without success.

The Council resolved that as an effective means of preventing further acts of vandalism, notices be posted at the Post Office and various prominent places, and at a spot near the tablet, offering a reward to any persons who should give information leading to the conviction of offenders.

A letter was read from the Under Secretary stating that the request of the Council for the use of ferro-concrete in the construction of the floors of the new building was too late, and could not be complied with.

The Treasurer reported that the Government had agreed to subscribe half the cost of an epidiascope, and that the balance—about £70—was required from the Societies and private persons.

Resolved that this Society contribute £15 15s. towards the purchase of the instrument.

ATTENDANCE ROLL DURING THE YEAR.

Council Meetings, 7.

Sir Langdon Bonython, M.H.R., J.P.	6
W. B. Wilkinson, J.P.	6
Dr. E. J. Eitel, M.A., Ph.D.	5
R. Kyffin Thomas, J.P.	4
S. Newland, J.P.	3
W. P. Auld	4
A. W. Dobbie, J.P.	5
A. W. Piper	5
A. M. Simpson, J.P.	5
C. L. Whitham	2
E. H. Bakewell, J.P.	4
T. Gill, I.S.O., J.P.	6
E. H. Newman, LL.B.	6
C. J. Sanders	2

THE LIBRARY.

ADDITIONS TO THE LIBRARY:

Royal Geographical Society, London, 1906-7, The Secretaries.

The Geographical Societies of Liverpool, Manchester, and Edinburgh, 1906-7, The Secretaries.

British Association for Advancement Science, London, York Meeting, 1906, Dr. J. Garson.

Royal Colonial Institute, London, Vol. xxxvii., 1905-6, The Secretary.

Royal Institution of Cornwall, The Secretaries.

Royal Dublin Society, 1905-6, A. H. Foord, Esq.

Royal Society, Edinburgh, 1906-7, The Secretary.

Société Geographie, Paris, 1906-7, Le Directeur.

Société Geographie Commerciale, Paris, 1906-7, Le Directeur.

Series Pamphlets, Paris, Prince Roland Bonaparte.

Bulletin der Musee Oceanographique, 1906-7, Prince Albert de Monaco.

Les Sociétés Geographie Havre, Tours, Marseilles, Neuchateloise, Schleswig-Holstein, Mitteilungen, Giessen, Finland, Lima, Milan, and Geneva, The Directors.

Royal Asiatic Society, Calcutta, 1905-6, B. Alcock, Esq.

Royal Asiatic Society, Bombay, 1905-6, R. N. Gray, Esq.

Royal Asiatic Society, Colombo, 1905-6, G. Joseph, Esq.

Museum Natural History, Madras, Edgar Thurston, Esq.

Ethnographical Notes in Southern India,

Academy of Antiquities, Stockholm Dr. Blomberg

Norske Georgrafiske Selskabs, Christiana, 1903-4, The Secretary.

Netherlandsche Indie Society, Batavia, Dr. W. Van Bemmelen.

American Geographical Society, New York, 1904-5, Geo. L. Hurlbutt, Esq.

Journal of Geography, New York, 1905-6, Professor Dodge.

American Academy of Arts and Sciences, Boston, 1905-6.

American Museum of Natural History, New York, 1906,
Morris K. Jessup, Esq.
New York Public Library, New York, 1906,
Dr. Jno. S. Billings.
Smithsonian Institution, Washington,
S. P. Langley, Esq.
Missouri Geological Survey.
Missouri Bureau of Geology Survey, 1905-6.
Series of Reports Michigan Academy of Science, 1905-6,
Dr. G. P. Burns.
Ecological Survey in N. Michigan, 1906, C. C. Marny.
National Academy of Science, Washington,
T. Trevor, Esq.
American Philosophical Society, Philadelphia, 1905-6,
Franklin Centennial Celebration,
J. M. Hays, Esq.
Philadelphian Museum, Philadelphia, 1905-6,
W. P. Wilson, Esq.
Geographical Society, Philadelphia, 1905-6,
Dr. Paul Sartain.
Boston Society of Natural History, Boston,
The Director.
Wisconsin, Academy and Natural History Survey,
Madison, 1905. The Secretary.
University of Montana, Montana, 1906, The Secretary.
University of Kansas, Lawrence, Kansas, 1905,
H. B. Newson, Esq.
Augustana College Library, Rock Island, Illinois,
The Librarian.
Missouri Botanical Garden, St. Louis, Mo.,
W. Treleaze, Esq.
Series of Volumes Academy of Science, St. Louis, Mo.,
1905-6, Dr. G. Hambach.
Geological Survey of Canada-Ottawa, 1905-6,
Cruise of Neptune,
Royal Society of Canada, Ottawa, 1905-6, The President.
Parliamentary Library of Canada, Ottawa,
M. J. Griffin, Esq.
Boletin Instituto Geologico de Mexico,
Mons. Jose G. Aquilera, Director.
South African Society, Cape Town, 1905-6,
L. Peringuez, Esq.
British Association for Advancement of Science, South Africa,
A. S. White.
Origin of the Bautu, Cape Town, T. J. Fawcett, Esq.

Voyage in Search of La Perouse in 1791-94, by Mons. Labilliére.

Phillipps' Voyage to Botany Bay, 1739, G. Brunskill, Esq.

Polynesian Society, New Plymouth, New Zealand, 1906-7, S. Percy Smith, Esq.

Report Survey Operations, Department Lands, N.Z., Surveyor-General.

Reports Timber Industries, State Nurseries, and Department Lands, N.Z., Under-Secretary.

Geographical Societies, Victoria, New South Wales, and Queensland, The Secretaries.

Royal Societies, South Australia, Victoria, and New South Wales, The Secretaries.

White's Voyage to N.S. Wales, 1790, G. Brunskill, Esq.

Children's Hour (South Australia), Director of Education.

Australian Museum, Sydney, 1906-7, S. Sinclair, Esq.

Science of Man, Sydney, Dr. Carroll.

Report of Public Library, Museum, and Art Gallery of South Australia, 1906, The Secretary.

Reports Northern Territory: Davenport Ranges and Victoria River, 1907, Hon. L. O'Loughlin.

The Agricultural Gazette, New South Wales, 1906-7, The Minister.

Report Department Mines and Agriculture, New South Wales. 1906, The Minister.

Report Department of Fisheries, 1906, J. A. Brodie, Esq.

Report Department Lands and Survey, New Zealand, Wellington, 1906, The Minister.

Report Department Mines, 1906, Western Australia, The Minister.

Report Department Lands and Survey, Western Australia, The Minister.

Journal Department of Agriculture, Western Australia, The Minister.

Western Australian Mining Industry, Department of Mines, The Minister.

Year Book of Western Australia, 1902-4, M. A. C. Fraser, F.R.G.S., F.S.S.

PRESENTED TO THE MUSEUM—

French Chart of Spencer's Gulf, Comte de Fleurieu, Paris.

A Series of Charts and Maps of the English and Welsh Counties; 18 vols. English Historical Manuscripts; 10 vols. Admiralty Sailing Directions and Sights; History of Glen Osmond; 2 vols. Geological Surveys of United Kingdom; Hertslet's Commercial Treaties; 2 vols. Department of Prints and Drawings British Museum; Large Comprehensive Atlas and Geography of the World, by Blackie, 1882; 2 vols. Royal Colonial Institute; 2 vols. Medallic Illustrations England and Ireland; Catalogue of Books on Natural History, British Museum; a new Geographical, Commercial, and Historical Grammar, Mr. Thos. Gill.

The Central State: its Progress and Resources; The Nile of Australia (the River Murray), D. J. Gordon, Esq.

Royal Geographical Society of Australasia.

SOUTH AUSTRALIAN BRANCH.

ANNUAL MEETING.

The Annual Meeting was held at the Society's rooms in the Institute, North-terrace, on Friday afternoon, May 31, 1907, the Vice-President, W. B. Wilkinson, Esq., in the chair.

The Secretary read the Annual Report, as follows:—
Since the last annual meeting, which was held on the 12th of May, 1906, the Council have held seven meetings. The names of several new subscribers have been placed on the roll of the Society, and a number of valuable works have been added to the library, which will soon be located in the new building on North-terrace. Then the old library will be supplemented by the York Gate Library. This library could not be made available for use until accommodation had been provided for it. The Society is in the proud position of being the possessors of the best collection of books relating to geographical science to be found in the Southern Hemisphere.

It is with extreme regret that the Council record the death of Mr. A. T. Magarey, who was a member of the Council, and had been for many years one of the Secretaries of the Society. He was certainly an exemplary citizen. He never spared himself in his efforts to promote the well-being of the community. His industry was untiring, and his enthusiasm in every good cause unfailing. He was one of the founders of the Society, and it never had a more energetic worker. His service was of the most generous sort. He took the keenest interest in exploration, was an encyclopædia of information in regard to the manners and customs of the aboriginal natives, and, with others, did excellent work in the erection of permanent memorials to preserve in the minds of the people the memory of interesting events in the history of South Australia. We shall long miss Mr. Magarey's cordial greeting and his genuine friendship, but it is a source of satisfaction to know that his life will continue to be an inspiration in the direction of noble aims and whole-hearted service in the public interests. The Council placed on record the following resolution:—"That the Council of the Royal Geographical Society (South Australia) deeply deplores the death of Mr. A. T. Magarey, one of the Hon. Secretaries and a founder of the Society, and that a letter of condolence be written to Mrs. Magarey expressing the deep sympathy of the members of the Council in her sad bereavement."

The Council have also to report the death of Sir Samuel Davenport, K.C.M.G., a founder of the Society, who was the first to preside over its affairs. His career forms part of the history of South Australia. He fell asleep at a ripe old age after having served his generation faithfully and well. What Sir Samuel Davenport was and what he did for South Australia are known to all, and the Council are very pleased that his honored name is associated with this Society.

A life-size bust of Sir Samuel has recently been presented to the Society by Mr. Howard Davenport, and this will be placed in a prominent position in the new rooms now being erected for the Society.

During the year two lectures have been delivered. One on May 18, by Mr. A. W. Dobbie, on "Coral Islands, Reefs, and Atolls: their Wonderful Formation and Beauty;" and the other on June 25 by Mr. T. S. Reed on "Primeval Man." Both lectures were well attended.

A statue, erected to the memory of Colonel Light, was unveiled on November 27, in the presence of a large gathering of citizens. The ceremony was performed by His Excellency the Governor (Sir George Le Hunte), at the request of his Worship the Mayor (Mr. Theodore Bruce). The statue has been placed at the entrance to Victoria-square, and is generally regarded as a highly successful piece of work. The gathering included old colonists who remembered Colonel Light. In this connection it may be mentioned that a statue has also been unveiled to Sir Walter Watson Hughes, one of the founders of the Adelaide University. The location of this statue is North-terrace, in front of the University. A movement is now on foot to put up a statue to Captain Sturt, one of the early explorers of South Australia. The movement is certain to achieve its purpose. It is gratifying to realise that Adelaide is doing something to perpetuate the memory of South Australian worthies.

Referring to the correspondence between your Council and the Government in August, 1902, respecting the protection of public monuments, a letter was received a short time since from a lady visitor at Port Victor informing the Council that the Flinders tablet at Encounter Bay had been disfigured by a number of names scratched on the plate, apparently with a pocket-knife, and that quite recently. Such acts of vandalism are simply disgraceful, and strict enquiries have been made through the Commissioner of Police and by our Secretary in order that the perpetrators of these wanton injuries may be detected and prosecuted.

The past year has not been a very active one as regards exploration in Australia. Valuable work, however, has been done in several directions. Mr. L. A. Wells, who has had great experience in important exploration work, is still in charge of the Trigonometrical party which was sent by the Government to the Northern Territory. He has furnished an interesting report on the country adjacent to the Victoria River, which should prove of great value in connection with the proposals for the transfer of the Northern Territory to the Commonwealth. Another experienced bushman, Mr. F. H. Hann, has made a journey from Laverton, Mount Margaret, in Western Australia, to Oodnadatta, by way of Mount Hinckley, Mount Davies, Opparinna Springs, Indulkana Springs, and Todmorden Station. Mr. Hann has given the gratifying information that by the provision of bores and wells a good stock route could be established between Laverton and Oodnadatta. Exploratory work, of which at present we have no details, is also being carried out by Mr. Montague in the country north-west of Hergott.

Abroad, the year has witnessed an unprecedented feat in Arctic research in the navigation of the north-west passage by Captain Amundsen, a Dane, who combined with it some excellent magnetic work in King William's Land, Greenland, where, as may be remembered, Franklin died in 1847. The existence of the passage was demonstrated by McClure in 1851, but fortune did not favor his attempt to explore it, and no further attempt had been made until Captain Amundsen essayed the task. Mention was made in our last report of Commander Peary's expedition towards the North Pole, but his achievement of April last year, when he outdistanced every predecessor, was not then known, so that it is left to us now to record the brilliant coup which carried him 30 miles past the Duke of Abruzzi's farthest north of the year 1900. The fascination which the Arctic region has for explorers has been demonstrated during the past twelve months by the departure last June of the Ericksen expedition from Copenhagen for purposes of coastal exploration between Cape Bismarck and Independence Bay; of Mikkelsen's Anglo-American expedition, on a three year's mission of investigation; and of Captain Bernier's expedition on behalf of the Canadian Government, which has been the means of adding to the British Empire eight islands near Baffin Land. Further contributions to the records of Polar research are likely to result from the Prince of Monaco's third expedition, which left in June for Spitzbergen; and from the Wellman expedition, which, with a better knowledge of air currents than was possessed by the ill-fated Andree, and certainly with better appliances, hopes to be wafted in a balloon to the Pole.

The competition of explorers in the Antarctic region has never been so keen as in the Arctic; but projects are in contemplation, notably that of Dr. Charcot, who hopes to reach the South Pole by ship, balloon, and motor sledge, which show that this field is not to be neglected, and there is no doubt that it will have its due share of attention from the International Commission for the Study of the Polar Regions, constituted in Brussels in September last in the hope of coordinating the methods of observation of all engaged in Polar exploration.

In this connection it is impossible to avoid mention of a curious phenomenon lately noticed by the officials of the Hydrographic Bureau at Washington, viz., the unprecedented distance from the Antarctic region at which many icebergs were found by navigators last year. This, taken in conjunction with Captain Josselyn's observation made when near the equator, that he found the water on both sides of South America 10 degrees colder than the average, has suggested the theory that the great Antarctic ice cap has, through some cause not explained, suddenly parted company with its more precipitous portions. Last year the crust of the planet underwent extraordinary disturbance, earthquakes and volcanic eruptions being experienced in both the Northern and Southern Hemispheres and on both sides of the Atlantic. The oceans were not free from the upheavals, as shown by the disappearance of existing islands and the rise of new ones, sometimes smoking hot, from the sea bottom. The earth has been found liable to convulsive periods, which may last for years, and one theory connects the disturbances with the want of steadiness in the earth's axis, which some have supposed to be due to the sudden transfer of huge masses of ice from the Polar regions to the temperate zones, a view that should enhance our interest in Polar research.

In Asia the past year has found explorers busily engaged in the solution of problems connected with the geography, the desiccation, and the archæology of the continent. Nothing in its way could be more interesting than the story of the examination by Mr. Ellsworth Huntington, the young American explorer, of the desert region between Khotan and Lob Nor. In lake beds covered with salt and gypsum, and in river beds in which sand has superseded water, Mr. Huntington and his colleague, Mr. Barrett, found abundant evidence of that process of desiccation to which Central Asia has been subjected throughout historic time, and which explains the abandonment of cities once centres of thriving populations. Yet the researches of Mr. Huntington must yield in historic, if not in geographical, interest to those of Dr. Sven Hedin, whose journey along what was centuries ago the great highway between India and China, has thrown a good deal of light upon the spread of Buddhism from India to Central Asia, China, and Japan. Materials of art and industry, and even documents marvellously preserved amid the sand-covered ruins, have borne testimony to the activity of which the huge desert traversed by Dr. Hedin was once the scene. There can scarcely be a doubt that India would to this day have been pouring its trade into China through this channel, and have been receiving its caravans of Mongolian pilgrims drawn to its sacred spots, but for the irruptions of sand, which, extending from the third to the eighth centuries, submerged the ancient cities as completely as though they had been visited by floods that never receded. Such are the effects of the process which the savants tell us is simply a natural reaction from the glacial period. The Swedish explorer named above, after traversing Persia from end to end, has crossed the Himalayas into Southern Thibet, and adding to his laurels by valuable geographical observations, is now examining the sources of the Indus and the Brahmaputra. There are many who hoped that one effect of the convention with Thibet would be the throwing open of its great rivers to exploratory work, and who have been proportionately disappointed at the refusal of the British Government to allow even experienced and discreet scientists to enter Thibet, or at least to be responsible for their safety. Time does not permit of more than a bare mention of the labors in Central Asia of Dr. M. A. Stein, last heard of in the Nanshan highlands; of M. Obrinsheff, the Russian geologist; of Dr. Tofel's archæological expedition; of Count de Lesdain and his wife, who have crossed the Gobi on a journey from China to India; and of Mr. E. C. Young, an English engineer, who has been giving some attention to the borderlands between China, Burma, and Assam. It may be added that the past year has seen an end to all doubt as to the true position of Mount

Everest, which Captain Wood, of the Indian Survey Department, has found to be part of a group perfectly distinct from the central Himalayas, and to which he has generously added another 140 ft. to the 29,000 with which it had previously been credited.

It is interesting to find as we turn to Africa how completely the veil is being lifted that not many years ago—even since the time of Stanley—enveloped it. But the Dark Continent preserves its fascination still, if we may judge from the long periods, extending over years, during which explorers are content to bury themselves in its forests, the world forgetting if not by the world forgot. An effort of memory is needed to recall the date nearly three years ago when Captain Gosling and Lieutenant Boyd Alexander made their plunge into Nigeria with the determination not to turn back till they had reached the Upper Nile. Of all books of African travel Lieutenant Boyd's should be the most interesting when it is published. Captain Gosling has not, alas, survived the perils he so bravely courted. After skirting the north-eastern part of the Congo the expedition surprised in its native haunts that queer animal the okapi, whose discovery by Sir H. Johnston a few years ago occasioned such a furore in the biological world.

A good deal of exploratory energy has been expended during the year in mountain climbing, which Alpinists like Mr. A. F. Wollaston have found as exhilarating a pastime as it is in Switzerland. But in this occupation no one can show such a record as the Duke of Abruzzi, of Arctic fame, who ascended the snowy and mist-enshrouded peaks of Ruwenzori, including Dunwoni, which has an altitude of nearly 20,000 feet. The range, as the Duke explained in a lecture delivered at a meeting of the Geographical Society in London, under the presidency of King Edward, was identified by Stanley as Ptolemy's Mountains of the Moon, and as it is the only snowy range in the Nile basin, it must have been the one Ptolemy had in mind when he said that the Nile was fed from the mountain snows. Rising from the equator, Ruwenzori, which means the "rainmaker," has its summit buried in the clouds, and in its intermediate stage it epitomises every climate known to the world. Elephants, or at least traces of them, were found at 7,000 ft., monkeys at 9,000 ft., palms at 11,500 ft., leopards still higher, while at 15,000 ft. the lobelias were seen to bloom luxuriantly. Lake Chad, which is a perennial source of interest to explorers, has been the object of a good deal of attention from Captain Tilho, Lieutenant Audoin, and Lieutenant Marquardsen, while Commandant Lenfant has again distinguished himself by his skilful investigations in the region of the French Congo. M. Gautier has done as much for Central Sahara, and the great desert has been crossed by a new route by Mr. Hans Vischer, an official under the Nigerian administration.

In American exploration the event of the year has been the ascent for the first time of Mount McKinley, in Alaska, by Dr. F. A. Cook, of the Belgian Antarctic expedition. Not merely the altitude, 20,464 ft., but the inhospitable nature of the surrounding region made the feat one of great difficulty. Some interesting problems have been solved by Dr. Rudolf Hauthal in connection with the glaciation of the Andes of Bolivia and Peru, while the interior of Newfoundland, still almost a terra incognita, has been explored by Messrs. Millais and McGaw as far as the upper basin of the Gauder River. The geography of the ocean has made great strides of late, but few achievements in this direction can compare with that of the United States cruiser Nero, which in surveying between Guam and the Medway Islands last year, took some soundings at the record depth of 5,269 fathoms, being only 66 ft. less than six miles.

The Chairman, Mr. W. B. Wilkinson, moved the adoption of the report. He regretted that Sir Langdon Bonython was not present to receive their thanks for his exhaustive and deeply interesting address, which was an able epitome of the world's geographical proceedings for the year under review. It was not only of interest to them as citizens of the Commonwealth, but owing to its international character, it would be regarded by the members of the many foreign societies to whom copies of the Society's proceedings were forwarded as a valuable geographical record. If they had a regret regarding the contents of the report, it would be that so little had taken place in Australia in the nature of exploratory work that the reference to this country was necessarily brief, but they hoped that during the coming year there would be more to chronicle of Australasian geographical interest.

Mr. A. W. Piper seconded the motion. They were grateful to Sir Langdon Bonython for his services to the Society. He suggested that the projected trip of Lieut. Shackleton to the South Pole should be mentioned in the report.

The report was adopted.

The balance-sheet showed a credit balance of nearly £2.

Officers elected:—President, Mr. W. B. Wilkinson; Vice-President, Mr. A. W. Piper; Council, Sir Langdon Bonython, Rev. Dr. Eitel, M.A., Messrs. S. Newland, R. Kyffin Thomas, W. P. Auld, A. M. Simpson, C. L. Whitham, A. W. Dobbie, and E. H. Bakewell; Treasurer, Mr. T. Gill, I.S.O.; Joint Secretaries, Messrs. C. J. Sanders and E. H. Newman; and Secretary, Mr. T. S. Reed.

On the motion of Mr. H. A. Parsons, appreciation was expressed for the services of the various officers during the past year.

LECTURE ON

Coral Islands, Reefs, and Atolls: their Wonderful Formation and Beauty.

(Delivered at the University of Adelaide to the Members of the Royal Geographical Society, May 18, 1906.)

By Mr. A. W. Dobbie, J.P.

To the lovers of the wonderful and beautiful the study of nature and her works yields a satisfying and deep-seated pleasure, which cannot be obtained from the more ordinary and frivolous enjoyments of life.

Whether we wander among the astonishing developments of plant and animal life on the surface of the globe, penetrate into the bowels of the earth,dive into almost unfathomable depths of the ocean, or revel in the wonders of the starry realms, we are everywhere met with facts and phenomena, which astonish and fascinate the mind and induce a desire to plunge deeper, rise higher, and peer more closely into the secrets of Nature above, below, and around us.

The particular page of Nature's book which it is my pleasing duty to introduce to your notice this evening is an illustration of what great and far-reaching results have been produced by her slow, silent, and unobtrusive operations during the long ages of the past, and which at the present moment are still going on.

Although I shall speak of many things and places I have personally seen, I desire to say that the explanations I shall offer are obtained by a close study of the works of Darwin. Huxley, Sir Wyvile Thompson, Professors Sollas, Aggassiz, Bonney, and other gifted men of world wide fame and authority; so we shall build on a good foundation.

All thoughtful travellers who are privileged to voyage among the thousands of islands in the Coral Seas cannot fail to be impressed by the immense numbers of islands that lie like level floating gardens on the surface of the ocean, without the semblance of a mountain or even a hill. But the observer is still more astonished when, immediately on the steamer passing through a short, narrow channel, he suddenly finds himself transported from the rough, tumbling sea into a beautiful calm lake or lagoon, surrounded by a ring or belt of land, more or less covered with the graceful cocoanut, and other magnificent palms, trees, and shrubs, and occupied by scores of native huts, picturesquely nestling under the shade of the trees, the whole forming a picture that, once seen, can never be forgotten.

Islands of this character are termed atolls.

Previous to Darwin's investigations it was well known that these islands were formed through the agency of the coral polyp; but the peculiar ring or belt formation was a great geological puzzle, and no satisfactory theory of its production was forthcoming, although it was thought by some that these ring-like islands were built upon the rims of submarine craters.

However, in 1831, Darwin started on his five years' voyage round the world on board H.M.S. Beagle, which gave him abundant opportunity to study these islands in detail in various parts of the equatorial belt; and after many years of investigation and careful study he came to a very deliberate and decided conclusion as to the life history of these wonderful and peculiarly formed islands, which can be counted by scores, and which, divided up as they are by Nature into many parts, represent many hundreds of the beautiful islands of the tropical seas.

Darwin's conclusions were not the mere speculations of a theorist, but the deductions of a patient searcher after truth, and were based on an examination of geological and zoological facts, and, therefore, stood on a solid foundation. In referring to the considerations by which he was guided, I hope to be pardoned by those in my audience to whom this subject is familiar.

The first point to be noticed is the undoubted fact that, through all the ages of the world's history since the formation of its external crust, its surface has been subjected to great changes in contour. The shrinkage occasioned by the loss of heat has produced foldings, elevations, and depressions, mountain ranges and deep valleys. This process was not confined to remote geological eras, but is still going on. Evidences of this action are to be found at our own doors, and its results are capable of ocular demonstration.

Should you visit the large island of New Guinea, just north of Australia, you will find that many of the birds and mammals of that island were identical with those of Northern Australia. Take, for instance, the flightless or wingless cassowary among birds, and among animals the spotted cuscus (a kind of opossum), the native cat, ringtail opossum, and kangaroo. Both places also contain species of tree kangaroo, several species of flying opossum and the slender-limbed bandicoot; but, more convincing still, the unique and wonderful Echidna is also represented in both places, and in no other part of the world except Tasmania.

Surely the simple fact of the existence of these strange creatures, which are peculiar to these countries alone, is ample evidence of their having at one time been connected. By referring to any ordinary map it will be seen that the Straits are not only shallow, as indicated by the white color, but are dotted with islands that were, no doubt, originally portions of the mainland of Australia.

The fact of the great difference between the inhabitants of Australia and New Guinea only proves that the separation of the two countries had taken place before man made his appearance on the scene.

It is also generally admitted by geologists that Tasmania was originally a portion of Australia, and the shallowness of the Straits between certainly favors that idea.

As for proofs of elevations, they are so numerous in all parts of the world that very slight reference to them is sufficient. Fossils of sea shells are to be found in abundance within a few hundred yards of this University by digging a few feet into the earth. I have many times when a boy dug scores of perfectly formed fossils of sea shells out of a quarry immediately behind Government House, whence the stone to form the foundation for the metal for the road between the City Bridge and King William-street was quarried. Those of you who had the privilege of listening to Mr. Howchin's interesting and instructive lectures on the "Geology of South Australia" a few months ago will remember that he showed us a picture of a bed of coral-formed rock 100 ft. in thickness at Wirrialpa, in the interior of Australia, which proves that Wirrialpa district was at one time a sea bed; and later, when speaking of the Atoll of Funafuti, I shall refer to coral rock in Switzerland 10,000 ft. in height. Many of the coral islands in the Pacific have been elevated after formation. Dana gives a list of about fifty that have been elevated from 2 ft. to 600 ft.

A particularly interesting and convincing proof of the subsiding and elevating movements of the crust of the earth at the present time is the Temple of Jupiter Serapis, situated at Pozzoli, near Naples, which proves beyond all doubt that during the past 2,000 years that that part of the coast of Italy has first subsided at least 30 ft., and after many years submergence was again elevated some 20 ft.

You will notice (see plate 1, fig. 1) that the boring variety of shellfish has disfigured the columns by boring a large number of holes of considerable depth into the solid stone, which is satisfactory proof that the columns must have been submerged many years. You will also notice that the foundations of the temple are still under water.

Since writing the above I have ascertained from the book. "The Gallery of Nature," that Mr. Smith, when visiting the spot in March, 1819, found that the floor of this temple was elevated about 6 in. above the level of the sea, and on visiting the building again twenty-six years afterwards he found that during the interval it had subsided fully 2 ft. For the purposes of this lecture I was anxious to know its present condition, so sent to Naples for a photograph of the temple and surroundings as they now stand. This arrived a few weeks ago, and will now be shown (see plate 1, fig. 2).

No doubt you will be as much surprised as I was to find by the picture that since the visit of Mr. Smith sixty-one years ago the elevation has been so great that new buildings have been erected between the temple and the sea, which is, indeed, very remarkable.

I may also mention that J. Addison, a highly educated and able writer and traveller of 200 years ago, states that numbers of buildings could be seen at the bottom of the sea on a calm day near Naples.

In addition to the above, I may mention that it is a well-known fact that large areas of land are now rising in Scandinavia and South America; and some believe that even the Himalayas are still undergoing elevation; so it should not be difficult to realise that oscillations of the earth's crust are still going on.

Another of the principal grounds on which Darwin built his theory of atoll formation is the fact that as a rule the coral polyp is seldom found and rarely active at a greater depth than 120 ft. Its operations are usually confined to much shallower water, though in a few isolated instances specimens have been met with at a depth of 300 ft., but those are not reef-building.

In travelling from island to island Darwin's observant eye noticed that certain variations in the relative positions of the coral reefs to the land occurred with a strange regularity. In many places he noticed that the shores of the mountainous islands were surrounded by a fringing reef; that is. the coral reef was actually joined to and formed part of the shore, as shown by the dark edge on plate 1, fig. 3.

At other islands Darwin observed that the land was encircled by a barrier reef [a belt of coral rock] at a considerable distance from the shore, with a channel of deep water between the reef and the land, as illustrated by the Island of Raiatea (plate 1, fig. 4).

At other places Darwin also found that the original land had apparently disappeared altogether, and what at one time had been a barrier reef had now become a ring-shaped island, or a series of islands in many cases, joined together by a reef, the whole forming what is termed an atoll, such as Bow Atoll (as shown on plate 1, fig. 5).

In the official soundings made by the commander of the Beagle, Darwin found that numbers of these atolls rose up like huge walls or ramparts of circular and other shapes, from immense depths of the sea, in much steeper fashion than ordinary mountains or even volcanoes in all other parts of the world. For instance, about a cables length (240 yards) from the Island of Ahii the depth of water was 1,800 ft.; also, at only 160 yards from the shore of Whitsunday Island there was no bottom at 1,500; so very probably the depth would be 1,800, possibly more. These soundings proved that the sides of these atolls consisted of precipitous cliffs, and the portions of rock brought up by the sounding instrument being ordinary dead coral rock, made it evident to his analytical mind that there must have been a great change of position since the rock was originally formed, because he had previously satisfied himself that living coral could not be found at greater depths than 120 or 130 ft. except in rare cases. This latter fact alone put the volcanic theory entirely out of court, because to make that theory fit the circumstances it would be necessary to suppose the existence of immense ranges of volcanic craters extending for thousands of miles under the sea, and that all the summits of the craters had been of an even height and reaching to within 100 to 150 ft. of the surface of the sea; otherwise they would be below the zone of coral life. Such an utter improbability was too absurd to have any weight. Some time afterwards Professor Huxley, when speaking on the subject, said—"What is there in physical geography to justify the assumption that there exists a chain of mountains stretching a thousand miles or more, and so nearly of the same height that none would rise above the level of the sea nor fall 150 ft. below that level?"

Darwin, after pondering over all these and other minor facts for many years (he never came to hurried conclusions, it took him twenty years to work out the problem of "The Origin of Species") gradually evolved his theory of coral island formation, which is without doubt one of the greatest masterpieces of exhaustive observation and brilliant generalization to be found in the literature of the world.

Whilst admitting the possibility of an atoll forming on the rim of a submarine crater, or even on what is termed a shoal bank, in exceptional cases his investigations led him to the final conclusion that the life history of the average atoll consisted of the following process (and he held to his original conclusion to the end of his long life). All or nearly all the islands in tropical and sub-tropical seas become fringed with what is termed a fringing reef, such as shown on plate 1, fig. 3, also in section in upper part of diagram, fig. 6.

This is a very rough diagram I have made to illustrate the process or stages, and as I do not profess to be a draughtsman I must ask you to be lenient in your criticisms. You will notice that on the upper part of the diagram the reef is actually joined on to and has become part and parcel of the island, and is what is termed a fringing reef. If the island is situated in a district where subsidence has set in after the fringing reef has been formed, both the island and the reef will slowly subside into the sea. Directly the reef becomes submerged the coral polyps, which, on reaching the surface, had ceased to grow, will now renew their activity, and the reef will increase upwards, and in course of time the land, having steadily subsided and the reef steadily risen, a space will be encased between the land and the reef (of course, filled with water), as shown by the middle part of the diagram, and thus becomes what is termed a barrier reef.

If the subsidence continues the last remains of the island will finally disappear under the sea, and the barrier reef then becomes an atoll, as shown in the lower part of the diagram.

If subsidence still goes on (as it has done in scores of cases) the crown of the mountain island will sink to still greater depths, whilst on the other hand the reef will continue to grow upwards somewhat like a circular wall or rampart, almost, and in some cases quite vertical (see plate 1, fig. 7). The case of Ahii, which I mentioned a few minutes ago, is a case in point, where the depth is 1,800 ft. (nearly the height of Mount Lofty) only a cable's length from shore.

The above is a very condensed account of Darwin's theory as to the origin of the average atoll, and after wading through many thousands of pages of arguments, for and against, in some sixty or seventy books, I find it difficult to conceive how any unprejudiced mind can come to any other conclusion than that Darwin is correct. At the same time from investigations made by Murray, Agassiz, Guppy, and others, it is evidently quite possible, and even probable, under exceptional circumstances, for atoll formations to be produced in other ways, such as on the rim of a submarine crater or on a peculiarly formed shoal bank.

Reference has only been made thus far to the process by which the atoll reef—which is a ring or belt or wall of coral rock from 200 to 600 yards in width—has been brought up to the surface of the sea, and the natural question that will at once occur to your mind is, "In what way does the reef become fitted for the growth of vegetation and the habitation of man?" Because the polyps can only build up to the surface of the sea. I think I ought to mention that, although I use the term "build," the coral polyps only build reefs in the same way as we may be said to build our cemetery, by depositing our dead bodies there. Up to this point the coral polyp has provided the material and foundation for the future island, and from this stage onward the ocean becomes the architect and builder of the structure above water level, as I will endeavor to explain.

You will readily understand that on account of the branching nature of many of the coral polyps the rock formed from their remains is full of crevices and joints. For instance, here is a photograph of a piece of coral (see plate 2, fig. 8), which I brought from the Sandwich Islands nearly thirty years ago, and it is easily seen that large masses of such rock would not be so compact as other geological formations. it is, in fact, full of small caverns and pierced with many sinuous recesses, much of the nature of a huge hard sponge. The sea water contains a certain amount of carbonic acid, which acts as a solvent upon the carbonate of lime, of which the coral is formed, and would thus to some extent weaken the joints of the masses of rock.

You will also know that these tropical regions are subject to terrific storms and hurricanes, raising tremendous seas, which strike with almost incredible force, breaking off large masses of these rocks and piling them upon the upper surface of the reef. This breaking off and piling up goes on until the mass of broken rock is about 10 ft. in height, and in the meanwhile they are being weathered into sand, which spreads farther over the reef. Sea birds now begin to settle there, and debris from the sea, in the form of pieces of wood, pumice stone, and other floatage collect, which become decomposed and combines with the sand, forming soil good enough for the germination of seed brought there by the birds, wind, and sea. Shrubs begin to spring up, vegetation in those humid climates quickly spreads; finally, man comes on the scene, and Dame Nature has completed her task of producing the wonderful atoll, crowned with a quiet scene of grove, lake, and snow-white strand, which both poets and prose writers speak of as the perfection of picturesque beauty, a scene of enchantment, and which, as I remarked before, when once seen can never be forgotten. We will now exhibit a general view of Whitsunday Island, which I have drawn, and photographed from a small woodcut in Darwin's Coral Islands. (See plate 2, fig. 9.)

In case any difficulty should arise in your minds as to the waves having sufficient power to break off and throw up masses of coral rock, I will now show an illustration which is a very forcible argument, and then give a few facts, which I trust will be satisfactory. (See plate 2, fig. 10.)

You will notice that tons of the smaller pieces are thrown right up among the vegetation, far above high water mark. This particular slide shows the work of only a few hours during a storm on January 29, 1884, at Port Denison, Northern Australia.

That same storm committed fearful havoc at Poole Island. It threw rocks weighing 100 lb. 30 ft. into the air, killed large numbers of birds, and did £12,000 worth of damage in an hour or two.

H. S. Cooper, in his interesting book, "Coral Islands," states that in May, 1877, when he was sailing about the Fiji district, a terrible wave came and swept away thousands of the inhabitants from off some of these low atolls, "some of which disappeared altogether." The same wave continued its course to South America, and did fearful damage on that coast.

The London telegrams in the Adelaide papers of March 6 (several weeks after I had written the above) described a similar occurrence in the following words: "A terrific hurricane devastated Tahiti and the Taumotu group. The storm raged for four hours, and wrought damage estimated at £1,000,000. It is believed that 10,000 people were drowned by the tidal waves blown over the coasts by the hurricane. Several small islands in the neighborhood are said to have disappeared."

I may also mention that the Island of Nurakita, 600 miles from Samoa, was found only a few years ago to be destitute of inhabitants, but had evidently been inhabited by a fine race, because there were numbers of unburied skeletons in various parts of the island, and all the men were over

6 ft. No doubt some such disaster as I have just described must have overwhelmed the island.

It will help you to grasp the situation when I tell you that Thomas Stevenson, in a lecture given to the members of the Royal Society of Edinburgh, stated that in connection with his investigations on the force of the waves, his dynamometer on one occasion at Skerryvore registered a pressure of 6,083 lb., or about 3 tons per square foot, and that the average wave-striking pressure for six months was 2,086 lb. He also stated that he saw the sea repeatedly lift a mass of rock weighing 40 tons.

Dana speaks of a block of 1,000 cubic feet being broken off and thrown upon the upper surface of the reef. No doubt the above is quite sufficient to explain Nature's method of forming the islands after the polyps have done their work in bringing the reefs level with the surface of the sea. Fig. 4 of plate 1 is a particularly interesting one, because Raiatea looks like a case of arrested development. You will notice the barrier reef contains a number of islets, but many are not quite ready for habitation. Evidently subsidence, which has been going on for ages, has now ceased, and the sea is breaking off pieces of the reef and building up small islets, which, in course of time, will increase in size and become fit for habitation. This island, including the barrier reef, is forty-four miles long and twenty-four miles wide. I would like to call special attention to the number of openings or channels there are in the reef. These openings were caused by creeks and rivers from the land, which bring down more or less sand and debris, to which the polyps decidedly object; in fact, they absolutely decline to reside in anything but the purest sea water; so all the places opposite the mouths of creeks and rivers are left severely alone. This is a useful provision of Nature, because these openings are valuable as entrances for ships and boats.

Bow Atoll (see plate 1, fig. 5), which is thirty miles long by nineteen wide, is a splendid specimen of an atoll in the complete condition, and at least eight of the islands are inhabited. You will notice that there is only one opening for the entrance of ships, and there are about twenty islands and islets on the whole of the atoll. It is a very remarkable provision of Nature that the trees always grow tallest on each side of these entrances, which enables the navigators to be certain of their course; otherwise it would be extremely difficult and dangerous to enter those narrow passages.

Menchicoff Atoll (see plate 2, fig. 11) is sixty miles in length, and covers an area of 500 square miles, and yet has only six miles of wooded land; and you will notice that it is without an entrance to the lake or lagoon. I have not found any reasons given for cases of this kind, but I have no doubt the cause is simply that the island, which has subsided must have been rather flat, and thus devoid of rivers and creeks of sufficient force to bring down sand and mud into the sea to interfere with the polyps. Of course, you will understand that these peculiar shapes, are brought about by the original outline or shore line of the island, around which the fringing reef was originally formed, so they are really registers of the sizes and shapes of the original islands.

The Maldiva Archipelago is 490 miles in length. "The king of this wonderful group of atolls bears the high-sounding title of Ibrahim Sultan, King of the Thirteen Attollons and Twelve Thousand Isles," which, Captain W. F. W. Owen states, is "no exaggeration." The special point of interest in this group is the fact that there are hundreds of small atolls within and even along the rims of the large atolls. The truth of Captain Owen's statement may be more fully realised as to being the "King of the 12,000 Isles" by referring to plate 2, fig. 12, which represents a small portion of the group.

This portion covers a space seventy miles in length, and includes scores of atolls and islands surrounded by deep water, and no doubt there are many too small to be indicated on a map; for instance, when in the Solomon Island Group a few years ago I was within fifty yards of one called "Killing Island," which was only about thirty or forty ft. in diameter. It was the island on which they usually killed their prisoners when about to have a cannibal feast. I have seen scores of islands from 10 to 100 yards in diameter.

No paper on the subject of atolls would be complete without considerable reference to Funafuti.

Whilst Darwin was alive he expressed a hope that some wealthy gentleman scientifically inclined would come forward some day and provide funds to put down a very deep bore hole on one of the atolls, and thus prove whether his theory as to their formation was correct or otherwise. As I remarked before, it is generally admitted that the various coral polyps do not flourish at a greater depth than about 120 ft., so that if a bore was put down to a depth of several hundred feet, and still remained in coral rock, it would be regarded as positive proof of the subsidence theory. The Royal Society of London took the position of the wished-for wealthy gentleman by taking the matter up, and, in conjunction with the New South Wales Government and committee of scientific men in Sydney, sent a boring party, under the charge of Professor Sollas, to Funafuti Atoll, one of the islands of the Ellice Group about sixty miles north of Fiji Islands.

Funafuti is a remarkable conical submerged mountain, almost circular at the base, which is about twenty-nine miles in diameter, and rises up from the abyssmal depth of over two miles. It rises at first with a gentle slope, but gradually grows steeper as it ascends till within about 2,700 ft. from the surface, when it becomes precipitous, and when about 800 ft. it rises in almost vertical cliffs, finishing with a ring-like ridge, which, when laid down on the Admiralty chart, strongly reminded me of an outline of poor Pat's head after an exciting and adventurous day at Donnybrook Fair (seen on plate 2, fig. 13).

The total diameter is about 8½ miles from the point of the broken nose to the bump of philoprogenitiveness at the back of the head and about eleven miles from the crown of the head to the neck.

Time will not permit me to give you particulars of the laborious and difficult undertaking in which Professor David and other Australian scientists carried out the second and deeper borings, but will simply tell you that, after many adventures and breakdowns they succeeded in getting down to a depth of 1,114 ft., and were still in coral reef rock, which the Darwinites consider is very conclusive evidence in favor of Darwin's theory of subsidence.

The complete atoll as seen above the sea consists of about thirty islands, all named, but some are so small as to contain only two or three cocoanut trees. The depth of the lagoon varies from 12 ft. to 180 ft.

Professor Sollas, after spending months on Funafuti, and also carefully considering the arguments of Drs. Murray, Judd, Skeats, and others, came to the deliberate conclusion that at any rate, so far as Funafuti was concerned, Darwin's theory of subsidence is absolutely proved to be correct, and if so with Funafuti, then, says Professor Sollas "it is natural to conclude that the theory will apply equally well to other islands of a similar character."

Another very important remark made by Professor Sollas is that he found, on comparing the borings of Funafuti with the dolomite peaks of the Tyrolese mountains, which are 10,000 ft. above the sea, the resemblance was extremely close, and concludes that at some former time they were coral rocks at the bottom of the ocean, whilst on the other hand the atolls of the Pacific seem to crown the summits of mountains which at one time rose to an unknown height above the sea. Sir John Lubbock also refers to the coral formations of the Tyrolese.

One writer on the subject of atolls makes the surprising statement that on sounding the ocean only 100 yards from the shore of one of these islands no bottom was found at a depth of 1½ miles. If the above statement is correct it practically means a vertical wall of coral 1½ miles in height.

Professor Huxley, when speaking on this subject on one occasion, said: "If the ocean could be suddenly drained away, we should see the atolls rising from the sea-beds like vast truncated cones and thus we might imagine the area of the Pacific, now covered by the Polynesian Archipelago, as having been at some former time occupied by large islands, or may be by a great continent with the ordinarily diversified surface of plain, hill, and mountain. The shores of this great land were doubtless fringed by coral reefs, and as it slowly underwent depression, the hill regions converted into islands became at first surrounded by fringing reefs, and then as depression went on these became converted into encircling reefs, and these finally into atolls, until a maze of reefs and coral-girdled islets took the place of the original land masses."

I have made a model of Whitsunday Island with a view of illustrating Huxley's remark re "truncated cones," the photograph of which see plate 3, fig. 14.

In some cases the subsidence proceeds too rapidly for the coral polyps to keep up with it, and the result is what is called a drowned atoll. Chagos Bank is an instance of this process.

Plate 3, fig. 15, is from a diagram I made in accordance with Darwin's illustration, and I think it makes the subject clear, as it shows the atoll in section. It is quite possible that at one time this may have been an inhabited island, although on the other hand it may have been drowned before reaching the surface of the sea. Darwin states that there are numbers of cases of this kind.

We will now pass on to notice one of the most marvellous physical formations of this globe, and which has a decided bearing on our subject. I refer to the great Barrier Reef of Australia.

It is extremely difficult to realise the magnitude of this huge structure. If the celebrated and massive great wall of China, the enormous Nile Dam, recently erected at a cost of over £5,000,000, and the huge pyramids of Egypt were all rolled into one, they would sink into insignificance in comparison. It is beyond all doubt the most vast accumulation of organic remains on the face of the globe. This Great Barrier Reef rises from the enormous depth of from a few hundred feet in some places to 8,000 feet in others, like a huge artificial rampart nearly 1,200 miles in length. Dr. Jukes, who spent a great deal of time investigating this marvellous structure, states that "if laid bare it would resemble a gigantic and irregular fortification, a steep glacis crowned with a broken parapet wall carried from one rising ground to another. The tower-like bastions of projecting and detached reefs would increase the resemblance."

Darwin, Dana, and other prominent scientific men regard this great structure as having been produced on precisely the same lines as the average atoll, that is, a fringing reef was formed on the original coast of Australia in prehistoric times, after which the coast slowly subsided, thus leaving a broad deep channel between the reef and the land, the polyps meanwhile continuing to grow have gradually erected this huge rampart of coral limestone, which gives us a permanent register of the original position of Australia's north-eastern coast. The average distance of the reef from the coast is about 25 miles, but at one point it is nearly 60.

In order that we might have an absolutely correct representation of the great Barrier, I purchased a British Admiralty chart as used by the captains of the steamers who navigate these dangerous waters.

Plate 3, fig. 16, is a photograph of the most northern chart, but I have blackened the reefs so as to make them more clearly visible.

Although the channel between the Barrier and the coast appears so beset with reefs and islets, there seemed abundance of room for our steamer to keep right on. The average width of the channel being 25 miles gives ample room for hundreds of reefs and yet leaves plenty of sea space for vessels. Of course you will understand that whilst the sea might be almost mountains high outside the Barrier, there is comparatively smooth water inside; and it is a beautiful sight and creates a pleasant feeling of safety to see the angry surf dashing on and over the reef, and yet our steamer be sailing along in fairly smooth water.

During our passage between the numerous reefs it was interesting to notice the various stages of islet formations to be seen. On one occasion I called attention to a solitary shrub about 200 yards from the steamer, growing apparently out of the sea with not a vestige of land within a mile of it. Evidently at low tide the reef would be dry at that spot, and there must have been sand and debris sufficient for the shrub's existence. The growth or formation of an islet *within* the channel would necessarily be very much slower than on the outer reef, because there are never very rough seas to break off and pile up the reef and debris. Our next slide will show an end or section view of the great Barrier Reef, drawn by Dr. Jukes, who spent months on the Barrier. It is shown in straight clean lines, but in nature it is irregular in form, and straight lines are conspicuous by their absence. It will help you to grasp the immensity of this structure if you will keep in mind that the outer side is over a mile in height; it is also interesting to note that according to the authorities on these subjects it takes the polyps one thousand years to build upwards to a height of five feet, so, supposing the coral rampart to be only one mile in height, it has taken over a million years to build. However, a million years is a very small item when geological formations are under consideration.

It is difficult to imagine the effect it would have on the mind were it possible to stand at the foot of such a huge structure and looks towards the summit, a mile above you. There is nothing in the world, so far as I know, to compare with this—the greatest organic structure on the face of the globe.

Before concluding my remarks on coral formation I must call your attention to the most peculiar constructions in connection with coral that I know of, and which will, I think, convince you that I have not exaggerated the steepness of the atolls and reefs. In some parts of the ocean there are isolated patches of umbrella formed coral growths, which are very remarkable. I have made a model from the description and pictures given by Dana, C.F. Hartt, and others, but my model is too symmetrical; the crowns should be more irregular in form. (See plate 3, fig. 17.)

Whales, after being harpooned have been known to pass under these formations and come out at the other side. The plate represents masses 100 feet in diameter across the top, 50 feet in height with stems 15 feet in thickness. In many places the tops become joined together, forming an immense platform level with the ocean surface, and form large numbers of arches supported by these huge pillars. The simple pillar formation shown in the model are very dangerous for shipping, because there is nothing whatever to indicate their presence, and occasionally captains when sailing through what they believe to be safe waters will suddenly find their vessel glide on to the summit of a coral column and there be suspended apparently in mid air because on dropping the sounding plummet they find deep water all round the ship. Not far from the Brazil coast there is a space nine miles by four, more or less covered by these strange platforms, and in rough weather the waves dash into them with great power, force the water up between the spaces of the platforms, lashing the sea into a mass of foam, giving the sea the very embodiment of anger and fury.

Masses of reef rise up almost or quite vertical in various parts of the ocean. On one occasion whilst a number of us were sailing along in a small boat from one small island to another in the Solomon group, we were astonished to see a native suddenly stop sailing his canoe in what appeared to be the middle of the deep ocean, jump out and stand alongside his boat, execute some repairs, jump in again and off on his journey. Two or three minutes later we passed quite close to the spot, and found that one of these masses of reef came up to within 18 inches of the surface, whilst all around it was the deep blue sea. I afterwards very much regretted that I had not wit enough to take a snapshot of him; but it is only one of my very many lost opportunities.

In concluding my remarks on these interesting subjects, I ask you on the authority of Darwin, Dana, Huxley, and other scientific teachers, to picture to your mind the present enormous blank spaces of the Pacific Ocean, as having in the distant past been more or less occupied by great islands, or possibly with a huge continent, with its plains, rivers, lakes, and chains of mountains. Both Darwin and Dana concluded from their investigations that the area of subsidence extends over a distance of 5,000 miles, and found reason to believe that a subsidence of 10,000 ft. has taken place, while during the period of depression other parts of the globe were gradually elevated to the same extent, thus balancing the movements of the crust of the earth.

The subsidence can only be registered by coral islands within about 1,500 to 1,800 miles along each side of the equator, because the coral polyps do not flourish outside of that limit, but subsidences have taken place elsewhere, including the Atlantic Ocean floor.

When Darwin first gave his theory to the public by a communication to the Geological Society of London in May, 1837, it took the scientific world by storm, and was hailed with acclamation. Even the Venerable Lyell—the greatest geologist of his time—went into ecstasies over it and admitted that "it covered the ground." There was an attractive grandeur in the conception of some great continent, having all its hills and pinnacles gradually, one after another in succession disappear under the sea, and become the humble foundations of the numerous atolls at present adorning the Pacific Ocean here and there at considerable distances; and which are now the only records of what had at one time existed. It was indeed a magnificent piece of reasoning and generalisation, and well worthy of the acclamation with which it was received.

I had fully intended to also discuss and illustrate the polyps themselves and their life history, and had prepared notes and a large number of lantern slides for that purpose; but found that it was impossible to sufficiently compress the subject of atolls and other coral formations to allow us to do so, I will, therefore, reserve the notes and slides for a future occasion, but show this slide (see plate 3, fig. 18), as samples of a few of the beautiful creatures which are the cause of the wonderful results I have endeavoured to describe. I will simply say that if you have found the subject of coral formations interesting and instructive, that of the coral polyps themselves is equally attractive.

PLATE 1.

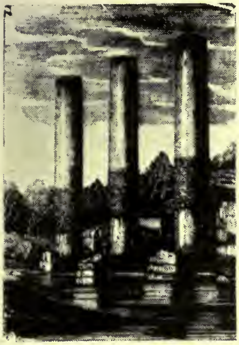


Fig. 1.

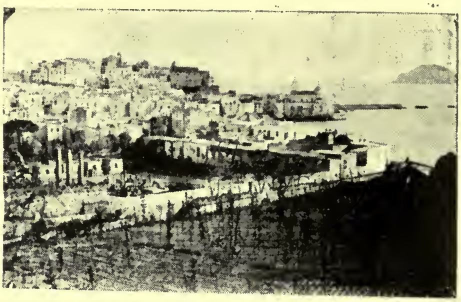


Fig. 2.

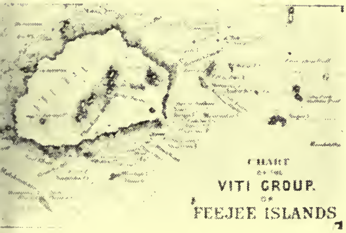


Fig. 3.

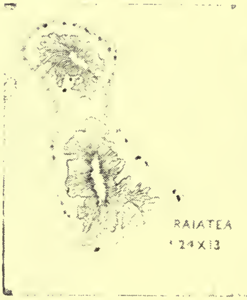


Fig. 4.

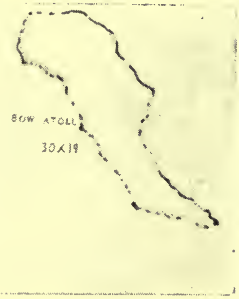


Fig. 5.

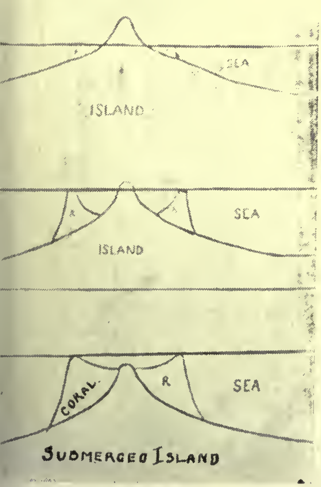


Fig. 6.

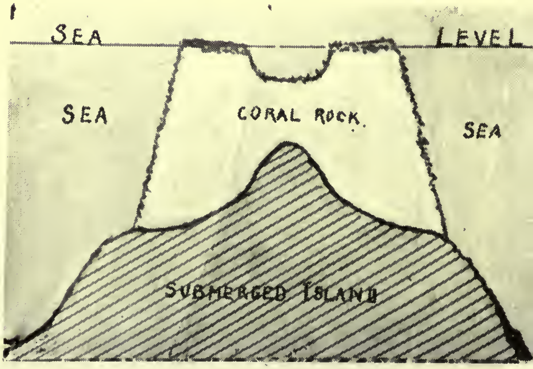


Fig. 7.

PLATE 2

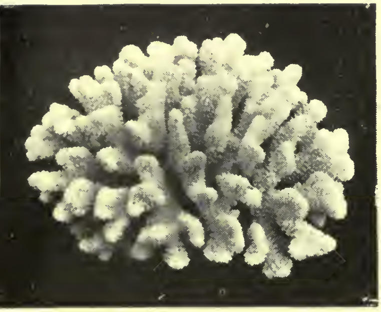


Fig. 8.

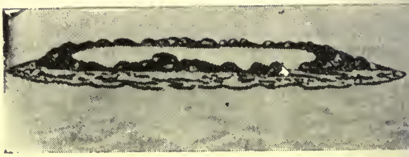


Fig. 9.

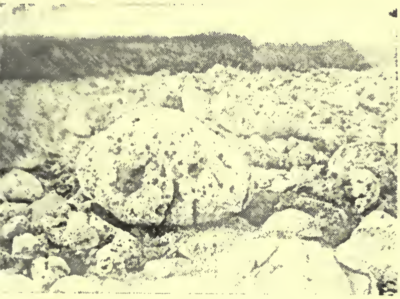


Fig. 10.

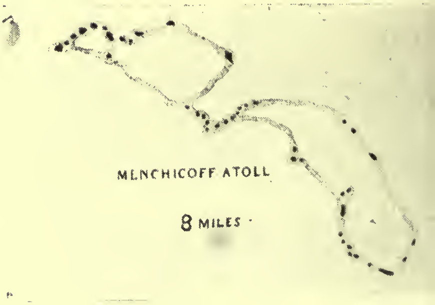


Fig. 11.

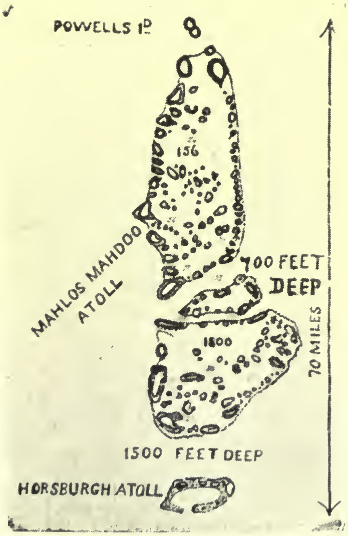


Fig. 12.

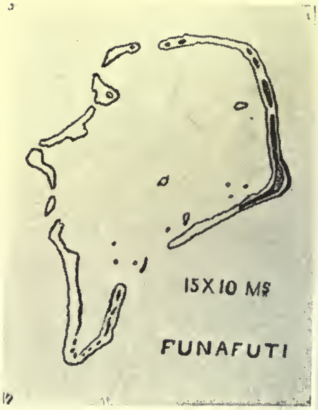


Fig. 13.

PLATE 3.

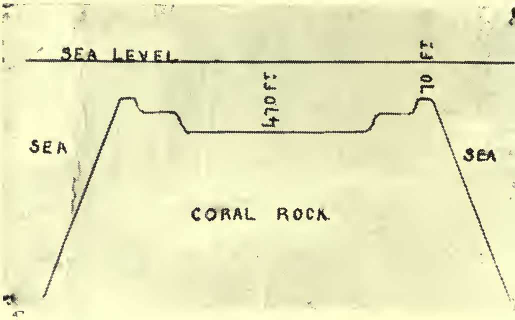


Fig. 15.

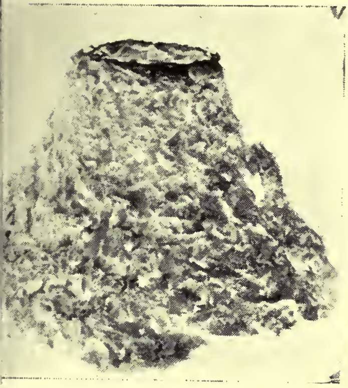


Fig. 14.

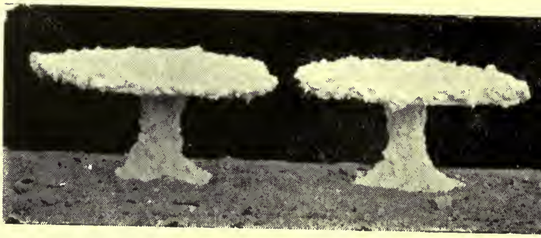


Fig. 17.

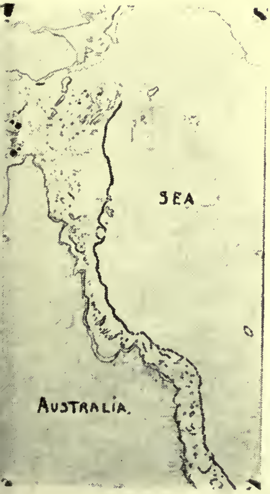


Fig. 16.

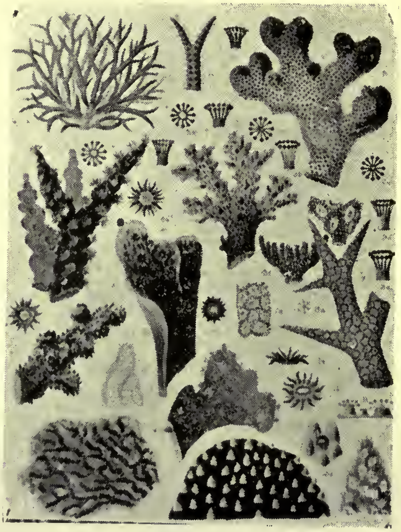


Fig. 18.

LECTURE ON

Primeval Man and His Companions.

(Delivered at the University of Adelaide to the Members of the Royal Geographical Society, June 25, 1906.)

BY THOMAS S. REED, J.P.

It would be a matter of profound interest if we possessed any available records disclosing in full detail an accurate history of the very earliest man—of the various races of men that have existed at different epochs of this earth's history, the conditions under which they lived, and the nature of all their surroundings, whether animate or inanimate.

Until a comparatively recent time the earliest age of primitive man, and, indeed, the Earth's age also, was assigned to a period of about 6,000 years. This was based upon an erroneous interpretation of the Old Testament; whereas in it nothing whatever of the kind is to be found, pointing to any time at which the earliest man made his first appearance.

Professor Simpson in an address to the University graduates at Edinburgh three years ago, said "I have seen the Earth grow old. Brought up to believe that it had been in existence only some 6,000 years, I know to-day that its age is to be reckoned by thousands of thousands, not of years, but of ages.

And the great geologist, Sir Charles Lyell, considered that to account for the various stratified deposits alone we must allow a period of at least two hundred million years. But far behind the earliest of such deposits was a vast and immeasurable time—it may be millions of ages—before the earth had sufficiently cooled down from its molten sunlike state to permit of the first steps towards solidification.

Dealing first with man in our Earth's present life history, the discoveries which have been going on for the past sixty years and are still in full activity have yielded a full disclosure of the Egyptian and Babylonian history and of their various Kings. The Egypt of the Pharaohs, the Babylon of Semiramis, and the Assyria of Sardanapalus, have been gradually unearthed and spread out for our perusal, giving in a very marked degree strong corroborative evidence of the truth of the Bible narratives. And it is very remarkable that the most ancient inscribed memorials extant of Babylon are those clay tablets which corroborate the Hebrew account of the Creation and the Deluge.

But far behind these historical records the existence of other races of men antecedent to those of our present earth history, but separated from us by great and unrecorded cataclysms, is unquestionable.

Before entering into this subject, however, a brief geological outline should be considered, as it concerns the location and strata in which these human remains have been discovered. In this outline I shall make an extended allusion to the different forms of animal life, human and otherwise, discovered in these strata, from various illustrations for which I am indebted to the writings of the Smithsonian Institution, the Royal Society, Edinburgh, Messrs. Pouchet, Figuiere and Meunier, and Professor Stirling, of the Adelaide University.

There have been five distinct divisions in the Earth's history anterior to our present period—the Archæan, Primary, Secondary, Tertiary, and Post Tertiary or Quaternary periods.

Each of these epochs embraced a long period of time, because each epoch has radically exhausted the generation of animals and plants peculiar to it. Some idea may be formed of the extreme slowness with which organic creatures modify their character, when we consider that the collection of animals of every country belonging to our geological period has undergone little if any alteration during the many thousands of years that it has been in being.

These periods have been a history of successive creations and successive destructions, old forms of life perishing and new forms appearing; so that the whole face of nature has been many times renewed.

The Primary Rocks form the skeleton, the supporting arch as it were, of all the other layers which in the lapse of ages have accumulated upon them.

During the Primary Epoch the Earth was covered with dense forests, and a luxuriant vegetation, the fossilized remains of which constitute our coal beds.

This view of one of these forests of the Coal period (plate 1, figure 1), although in a sense imaginary, is yet considered, from the diverse markings observed from time to time in the various coal measures, to bear a close approximation to the trees, shrubs, and plants from which they were derived. These gigantic Lycopodia, which play a great part in our coal formations, then bore great stems, towering to a height of 80 or 100 feet, although the existing ones are now reduced to humble creeping herbs.

In the Secondary Epoch, while the vegetable kingdom was the one prominent element, in the Tertiary period the animal kingdom predominated greatly throughout the whole globe.

The reptiles were of great number and gigantic size, many of which have been reproduced from the skeletons found in their entirety or otherwise, by the genius of a Cuvier or an Owen.

This was, indeed, the reptile age, an age in which a vast crowd of frightful and gigantic lizards spread terror throughout the antideluvian seas. Among these were the Ichthyosauri and Plesiosauri.

The Ichthyosaurus was a perfect paradox; it had the vertebra of a fish, the fins of a dolphin, and the teeth of a crocodile. It had no external ear, as the skin passed over the tympanic bone, as in the Chameleon and the Salamander; and although a water reptile, it respired the air directly, and was therefore often obliged to rise to the surface to inhale it. It had eyes as large as a man's head, protected in front by a framework of bony plates—eyes that were regarded by Dr. Buckland as the most powerful visual apparatus every known in creation, by which they could discover their prey, whether at long distances in the darkness of night, or in the depths of the ocean.

The Plesiosauri were remarkable for their turtle-like fins, and especially for the thinness and extreme length of their serpent-like necks. Besides these were the Iguanodons.

The Iguanadon was one of the largest reptiles of this period, dragging through those forests their vast frame 50 feet in length. It was amphibious, and fed mainly on herbs and vegetables, but frequently took to the water; and its dimensions were enormous, the thigh bone exceeding that of the largest elephant.

No less than 29 of these Iguanodons were once found in one spot—in a deep coal-bearing strata in Belgium 750 feet in depth. An examination of their coprolites shewed that they devoured an enormous quantity of fish, and occasionally their own species, shewing that they had cannibalistic tendencies. Their remains have been peculiarly abundant in England—in the Counties of Dorset, Somerset, Gloucester, Leicester, and in the Valley of the Avon between Bath and Bristol.

Following these is a group of three gigantic reptiles—Dinosauri (plate 1, figure 2). The one to the extreme right, the Mosoaurus, sometimes attained a length of 70 feet; one of the great swimming snake-like reptiles, literally the sea-serpents of the era, having, indeed, articulated jaws, the precursors of our own modern smaller snakes, with two rows of teeth along the roof of the mouth adapted for seizing their prey, as do the snakes themselves. This huge reptile waded in the waters or prowled over the land, not as a ground crawler like the alligator, but with free steps, and chiefly on the hind feet, which were three toed.

The Mosoaurus received its name from the Meuse, the place of its first discovery. It was said that the oar-like construction of its tail indicated a capacity to move with great rapidity in the ocean after the large and powerful fishes upon which, from the great size of its jaws and teeth, it is conceived to have preyed.

The skeleton remains of another kind of Dinosaur named Stegosaurus, or the Plated Lizard, were found in the Rocky Mountains. These lizards had diminutive heads, a small foreleg, long tails armed with two pairs of sharp spines, while from the spines to the neck ran a series of large, thin, sharp-edged plates about 2 feet in height and length. The spines varied in length from 8 inches to nearly 2 feet; and when swung by a tail about 10 feet long, would be calculated to distinctly clear the way.

But among all these monsters the most remarkable was the Pterodactyl, described as forming a sort of combination of bird, mammal, and reptile. They resembled enormous bats, having large wings and a very pointed head supported on a slender neck, and they lived mainly on insects, as evidenced by their remains discovered inside the fossilized skeletons. Plate 1, figure 3, accordingly represents him as actively engaged in these entomological pursuits. Some naturalists believed that these Pterodactyls suggested the first idea of that mythical and legendary animal, the dragon.

There was, however, more truth in the dragon than is generally supposed, for more than one reptile in those ages long before the advent of man presented many points of resemblance to those mythical creatures, and among these, the Ceratosaurus, nose horned lizard, with tiny forelegs, powerful sharp-clawed hind feet, and well-armed jaws, and of enormous size—50 feet in length. His natural amusements were said to be a series of combats with his fellows, leaping, biting, and tearing his enemies to pieces with tooth and claws.

But the one extraordinary feature with nearly all these reptiles was the extreme minimum of brain substance. The smallest human brain compatible with life is 10 ozs., and that compatible with reasoning powers 2 lbs., and this in a man weighing from 120 to 150 lbs. One Dinosaur, the Cleosaurus, 25 feet in length, and standing 12 feet high, had a brain smaller than a man's fist, and weighing less than a pound. Another, the Brontosaurus, 60 feet long, twice the bulk of an elephant, and weighing over 15 tons, possessed a brain weighing only 2 pounds.

In the Tertiary Epoch, when the crust of the earth had cooled down and augmented in thickness, the legion of frightful reptiles disappeared altogether, and were replaced with a race of animals of colossal size, giants of the animal kingdom compared with those of our period, and which spread over the whole earth from pole to pole. This was the epoch of the mammals, including the Mastodon and the Dinotheria, analagous to the elephant, but much larger.

The fossil bones of some immense marsupial fauna so peculiar to this Tertiary age were found not long since on the shores of Lake Callabonna, in Central Australia, such as the Diprotodon Australis. A complete cast of its skeleton may now be seen at the Adelaide Museum.

It was in this Tertiary period that the seas of the Paris basin abounded in such rich deposits of shells, among which was the gigantic Cerithium (C. giganteum), which attains a length of nearly 20 inches, besides a host of other shells in the most marvellous state of preservation.

Under this head, however, there is one feature of intense interest that marked this particular epoch, viz., the existence of small shells—Nummilites, so named from their resemblance to a piece of money (Latin nummulus), and some nearly the size of a penny. These shells multiplied at so prodigious a rate that they formed imposing chains of mountains in different parts of the world.

Of almost equal historic interest were the small shells called Milliolites, far smaller than the above, and so named from the fact that their size is just that of a grain of millet.

These Milliolites in the ancient seas of the Paris basin multiplied at so prodigious a rate that in settling down they also formed long chains of mountains, which are now quarried to build many of the French towns. In fact, the greatest part of the stone of which the houses of Paris are built is composed simply of these minute and fragile shells agglomerated and closely cemented together.

And touching this existence of animal life, it is stated by Dr. Milner in his "Gallery of Nature" that whole masses of the solid materials of the globe appear to be composed almost entirely of the remains of animals or plants. And Dr. Mantell, the geologist, says:—"I counted forty-eight different strata of stone—marble, rock, marl, &c., composed principally of fossils, shells, sponges, corals, human bones, reptiles, and various animals up to the Mastodon."

In this same Tertiary epoch were fossil shells of still greater size than the Cerithium, viz., the gigantic Tridacna (plate 1, figure 4) which was used in the Moluccas as a bathing tub. These shells are also used as fonts in some R.C. Cathedrals of the Continental cities.

The Post Tertiary or Quaternary Epoch, in the latter portion of which we live, according to Dr. Croll, and confirmed by Sir Robert Ball, Astronomer Royal at Cambridge, commenced 240,000 years ago. It was during this epoch that we had the Glacial period, by which a large portion of Europe was covered with ice, which traversed its course from the Pole southwards, when some mountain chains were slowly upheaved thousands of feet above their present level, and others were sunk thousands of feet in the ocean depths.

As the result of these enormous convulsions or cataclysms, Professor Geikie, and also Dr. A. R. Wallace, favor the probability of a land connection that once existed between Australia and New Zealand, from the predominating influence of the New Zealand flora. Dr. H. O. Forbes also believes that an ancient Southern Continent extended from Australia to Africa, South America, New Zealand, and the Antarctic lands, this view being based upon the fossil remains of animals throughout the Southern Hemisphere.

The animals in the Quaternary Period were similar to the last, but remarkable for their immense size and dissemination. First, we have a gigantic mammoth (plate 1, figure 5), with tusks describing a half-circle, and more than 9 feet long, the head alone weighing 4 cwt., and with a long mane hanging from the neck. The skin was covered with black hairs and a reddish sort of wool. It attained a height of about 14 feet, although Pouchet says a skeleton was discovered in Switzerland considered by M. Plater, an anatomist, as that of a giant mammoth 19 feet high, a sketch of which is deposited in the College of the Jesuits, Lucerne.

Among the most remarkable discoveries was the case of a mammoth which was found in the extreme north of Russia in 1799 by some fishermen, enveloped in a block of ice near the mouth of the Lena, which had been preserved in its entirety through many thousands, perhaps millions, of years, and on which, when thus exhumed, the bears and dogs flocking to the spot made a huge banquet. Almost the whole skeleton was saved, and may now be seen in the Museum of St. Petersburg.

Then followed the Rhinoceros, which was also clad in thick shaggy hair, and by its twofold covering of wool and hair shewed the same adaptation to a cold climate as the Mammoth. Its skin was tough and leathery, though free from the scales on the hide of the existing African Elephant; and the nose was surmounted by two gigantic horns. The Rhinoceros, together with the Cave Bear and the Mammoth, are still found in company with human bones in the caves throughout Great Britain.

The Rhinoceros, together with the Hippopotamus and other mammals, were then in the habit of roaming over Europe in immense herds, just as some of these animals still do in the interior of Africa. And these great mammals must have had their favorite haunts—spots where they assembled together in thousands; for otherwise it would be difficult to account for the countless numbers of bones which are found accumulated at the same spot.

Besides these were several species of Hippotamus, a Bear of great size inhabiting caverns, also a Cave Lion and the Atlantosaurus (plate 2, figure 1), an extinct and gigantic monster which abounded in the Colorado of North America over 80 feet in length; and, as it walked on its hind legs, its head would have been at least 30 feet above the ground.

Then followed the Megatherium, a gigantic creature in the form of a Ground Sloth; a cast of the skeleton is now in the British Museum in the act of grasping the trunk of a tree. It was about 18 feet in length, the limbs were of tremendous strength, the thigh bones being nearly three times as thick as those of the elephant, and the feet were armed with powerful claws. They lived on the leaves and small twigs of trees, tearing up, as Professor Owen believes, the smaller trees by the roots and pulling down to them the branches of the larger ones. Nearly all these species are now extinct, but man, as we shall see, certainly existed in the midst of them—the precise period none can tell; the history of the first man and of the very earliest stage of the earth on which he lived must ever remain an unrecorded mystery.

And we find that in the face of the violent convulsions, the deluges, the horrible ice invasions, and the consequent changes of temperature and climate which occurred during this epoch, that these animals, Mammoths, Rhinoceroses, Hippopotami, Cave Bears, Lions, and others were spread far and wide over the whole earth, as their skeletons and other remains are to be found in America, in France, Germany, India, Russia, Siberia, in England in the bed of the Thames, in Norfolk and other Counties, and also in Scotland.

But when this great glacial wave—this grim winding-sheet of snow and ice swept over the globe, it came slowly down upon these gigantic mammals, resulting in their complete extinction.

Whole skeletons were often found on the spot where they had expired, and, as before stated, Mammoths were discovered in the ice, clothed still with the skin and long hair of which they possessed so thick a covering.

And these mammals were found in the north of Asia especially. The debris of the ivory mines of New Siberia and of the Island of Lachoo is so rich that their soil is absolutely a mass of sand, ice, and elephant tusks, of which at every great storm there the waves throw up a great number, some of them weighing as much as 2 cwt. In fact, the richness of these Arctic cemeteries and the colossal size of the remains are to this day a constant source of wonder to the Siberians and Tartars.

And now, looking for evidences of the appearance of primeval man late in the Tertiary and all through the Quaternary epoch—if he *did* exist at those or at any remote period, he must have left traces of his presence in the spots which he inhabited, in the shape either of some implements of fishing and hunting, or of weapons wherewith to strike down any prey stronger than himself. These implements and weapons have been patiently sought for, and have been discovered in certain strata, some preceding, and others subsequent to, the cataclysms and convulsions of the Quaternary epoch. His existence has also been revealed sometimes by the presence of human bones buried in the earth and preserved through long ages of time.

The comparatively limited number of human remains which have been discovered can be traced to three causes—their proneness to decay when buried at shallow depths, the knowledge that the tribes of primitive men often burned their dead, and thirdly, because the human race then formed but a very scanty population.

Another proof of the existence of man in that epoch and far anterior to the present era, is found in the intermixture of human bones, not only with the relics of the implements and weapons he used, but also with the remains of these antediluvian animals which lived only in the Tertiary and Quaternary Epochs, and have been for many thousands of years extinct. This intermixture has often been met with under the ground, in caves, or deeply buried in the earth.

The earliest discovery of prehistoric remains was made by J. N. Esper in 1774, who found some human bones mingled with remains of the Great Bear and other species then unknown in the celebrated Cavern of Gailenruth, in Bavaria (plate 2, figure 2), and in strata of the Quaternary period. This was followed by the discovery of John Frere, an English archæologist, who in 1797, at Hoxne, in Suffolk, found some flint weapons intermingled with bones of animals belonging to extinct species under strata anterior to those of the Quaternary Epoch.

Again in 1833 the French geologist, Mons. Aimé Boué discovered some human bones in the Quaternary loam of the Valley of the Rhine. Then followed the important explorations of Monsieur Boucher de Perthes in 1838, in the celebrated Quaternary gravel beds at Abbeville, where implements and human bones were discovered embedded in stalagmite, together with remains of the Great Cave Bear, the Mammoth, and Rhinoceros.

Many of these flint implements discovered in various strata of the Tertiary and Quaternary periods may solve a difficulty which no doubt has suggested itself to all of us, and that is how man at that period, surrounded as he was by herds of colossal mammals, was able successfully to cope with them.

The natural inference is that in the presence of the colossal beasts of those far away ages, man himself was proportionate in strength and stature to his environments. And this is borne out by fact—for taking two among many other instances—at Meilon, in Switzerland, and also at Cromagnon, in France, a number of various human bones were discovered, showing by their enormous size and strength that man in this Quaternary period was of the strongest and most athletic developments.

Plate 2, figure 3, will give some idea of the strength and stature of the man of that epoch as pourtrayed from the size of these human bones then discovered, and illustrates a man of the Stone Age in the full action of self-defence, with a large bone of the Cave Bear in his hand and one of these hatchets at his feet. They also invented strong bows and chipped out sharp arrow heads, with which they were able to arrest the progress of animals in their flight.

In the presence of numbers, at any time, in the presence of a formidable band, man could have had no resource but flight, but when we consider his great strength on the one hand and the character of the weapons he used, we can understand how with such implements he was able to repulse the attacks of any ferocious animals which often assailed him, among other weapons by flint hatchets of large size, and of the so-called Almond type, which were carefully chipped so as to present a sharp cutting edge, and when used were fitted on to one end of a strong wooden handle.

But man had other weapons besides the hatchets. In the Caverns of Ariege in 1862 Dr. Garrigou, of Tarascon, in conjunction with Messieurs Rames and Filhol, discovered more than one hundred lower jawbones of the Great Bear and Cave Lion, wrought by the hands of man so as to be more easily grasped, and furnished with an immense tooth, thus rendering them formidable weapons either for attack or defence.

From the character of the implements they used, the earliest men were called "Palæolithic."

The Palæolithic implements were all chipped—one hard blow skilfully applied were sufficient to break off by the mere shock a sharp-edged flake of a blade-like shape. As Boucher de Perthes says, the first man who struck one pebble against another to make some requisite alteration in its form gave the first blow of the chisel which in after times resulted in producing the Minerva and all the sculpture of the Parthenon. And then their chipped implements were far ruder and more roughly made than the more finished tools and weapons of their successors, the later races who were called Neolithic or Men of the New Stone Age.

And as the weapons distinctly differed, so did the men, both in character and location. Of the first—the Palæolithic—there was an earlier and later type. Relics of the former are found largely in beds of river gravels, from which they are called Men of the Drift; the later type were known as Cave Men because their remains are usually found in the caverns and rock shelters in which they lived. And this latter type gave distinct indications of progress, not only in a better class of tools and in the material selected, but also adding to the stone both bone and antlers, which latter disclosed spirited drawings of animals and carvings of similar forms.

Two fine illustrations of these carvings in horn and ivory are given in the Journal of the Royal Society of Edinburgh, taken from a rock shelter at Bruniquel—one a figure of a reindeer carved in ivory, the other a Mammoth carved in reindeer horn. A second represents two horses heads, also sculptured from a portion of reindeer horn, showing great ingenuity of the artist in the adaptation of the horn to serve his purpose.

The Neolithic implements were of finer workmanship, and were ground and polished; and from these races themselves sprang the various people who left their relics in Denmark in Stonehenge, and the various Sepulchral Barrows, Cairns, &c., &c., of Britain and Continental Europe. There was also a progressive increase of human intelligence and of brain substance. Beginning at the Java skull (plate 2, fig. 4), discovered by Dr. Dubois in 1794, a cast of which Professor Stirling kindly showed me at the Adelaide Museum, it was pronounced by leading anatomists as clearly human, but of very low type, and on the borderland between that of man and the Anthropoid Apes. A thigh bone and two molar teeth were also discovered in close proximity, and the thigh bone being perfectly straight, in opposition to the curve of the ape, showed that the Java man assumed the erect attitude as his normal mode of locomotion. Dr. Dubois has also demonstrated that although the brain substance is less than half the dimensions of that of the European of to-day, it is yet double of that possessed by the largest known Anthropoid Ape.

The next and higher step in advance was apparently the Neanderthal skull, which had a measurement half as large again as that of the Java skull; and a still farther advance is seen in the skull of the Stone Age at Furfooz, which was found by Mons. Dupont in a cave, intermixed with a number of human bones which had belonged to thirteen persons of different ages, together with various implements and animal bones of the great bear, reindeer, and others.

In this same epoch caves were also used as burial places. In the celebrated Cave of Aurignac, in France, a French artizan named Bonnemaison, from mere curiosity thrust his arm into a deep hole, and out of it drew forth a large human bone. On excavating the ground he came upon a slab of limestone, behind which a quantity of human bones were stored up, as in this drawing (plate 2, figure 5), then made of a vertical section of the cave, which, when collected together, were found to be the skeletons of seventeen individuals of both sexes. These, by the direction of the Mayor of Aurignac, were afterwards buried in the Paris Cemetery. Eighteen years afterwards, viz., in 1860, Mons. Edouard Lartet, the celebrated palæontologist, paid a visit to Aurignac, when unfortunately no one—not even the grave-digger himself—could recollect the precise spot where they were buried. Mons. Lartet then resolved to set on foot some excavations in the cave from which they were taken, and there made discoveries of great value. The floor of the cave had remained intact, and was found strewed with implements of human industry, flint knives and weapons of different kinds, and bones of the bear, reindeer, bison, &c. In excavating at a lower level still, he found the head and bones of the cave bear, of a rhinoceros, and of the mammoth and cave hyæna. Many of these bones were broken lengthwise and split for the purpose of extracting the marrow for the purpose of eating. Sometimes the marrow was extracted by a spoon, as discovered by Monsieur Lartet at Langerie Basse.

During the early part of the Quaternary Epoch tumuli were used as burial places. In opening one of these (plate 2, figure 6) at Axevalla, in Sweden, in 1805, they found 50 tombs of an almost cubical form, each containing a skeleton in a crouching or contracted attitude, as now shown; and when a second tomb was opened not far away at Luttra they found themselves in the presence of hundreds of skeletons placed in four rows, one above another, all in a contracted position, like those at Axevalla.

Another discovery of great interest has been made by the Prince of Monaco in explorations he has inaugurated in the Caves of Grimaldi, in Italy, where skeletons were discovered overlaid by an accumulation of deposits which have been pronounced by Dr. Verneau, of Paris, as belonging to the early part of the Quaternary period, when they made and used implements of stone only. In these skeletons the arms were relatively long, and the skull long and narrow, with a broad nose, presenting features which in many respects ally them to the negro type of cranium. In plate 2, figure 7, there are two of the skeletons:, one that of an old woman, the other that of a young man—placed side by side, the limbs bent up towards the chin, and stones being placed so as to protect the heads. The stratum in which they were found is unquestionably of the Palæolithic age, and shows that Palæolithics both honored and buried their dead. Messieurs Cartailhac and Emile Riviere always maintained that they *did* so, and the explorations of the Prince of Monaco confirm their assertion.

Such, then, are some evidences of the geological antiquity of man, which has been determined by a host of scientists; each working at different periods, and independently of each other—such as Boucher-de-Perthes, Lartet, Falconer, Rigollot, Prestwich, Evans, Lyell, Lubbock, and others.

And this is evidenced by the human remains, a number of bones here, and a skull there; and by the customs and pursuits of each successive race, as seen in the relics left behind, the implements and weapons they used, and how they used them—as, for example, in a cave at Lozere they found a skull of the Great Bear pierced with a stone arrowhead, and by its side fragments of pottery on which might still be seen the imprints of the fingers which moulded it.

In another place under a deep strata was a bed of charcoal and ashes 6 or 7 inches thick, used as a firehearth, and close by a number of animal bones, some scorched and carbonised by fire, and others exhibiting shallow cuts, showing that a sharp instrument had been used to detach the flesh.

And these, together with innumerable other relics, have been declared from time to time by various Palæontologists and learned men as still "enough to tell us of man's past history and habits with almost as much accuracy as if that history had been written."

And now, in conclusion, we have glanced at one epoch after another, each one of immense duration, each one carrying with it a separate race of man, a separate race of animals; and the one thought that comes home to us in view of these bygone ages of the past, is—what of the present, what of the future?

As we think of our present environments—of the globe in which we live in all its aspects, its rich luxuriant plains and valleys, its flowing rivers, its great mountain chains and snowy heights, we perhaps seldom realise that beneath all these, beneath an exterior so beautiful, so varied, lie the wrecks and the ruins of many a former surface as rich and beautiful and diversified as our own—when we think of the mighty cataclyms, volcanic and otherwise, that have wrought these changes—of another huge convulsion, when our own mother earth may be broken up and entombed in the rocks and ground beneath us, we ask ourselves: What then of the future?

When cometh a new heaven and a new earth, shall we and each of these preceding races be all united together in one in that eternal life of the future? They lie at our very feet, and near enough to answer if they could, and if they knew; for on every foot of ground we tread we walk over the dust of these myriads who have gone before us, who have lived and thought and written in the past, and so many of whose works (as seen in their inscriptions) do follow them. Are *we* then in this *our* time living up to the one noble ideal by which we can be characterised as a progressive race, far, far in advance of those our ancestors.

Can this be *said* of us in our present environments?

The English press for some years past has been teeming with articles on the deterioration of the present generation, of the artizan class especially.

In England, as we all know, the recruiting regulations were altered years since so as to obtain enough men to fill the regimental ranks, because those offering themselves were shorter, smaller, and feebler than those of former times.

And one naturally asks what might be the existing causes? Beginning at the infant: in England and Wales, in 1904 one-fourth of the whole deaths were infants under 12 months and one-half of these said to be from preventable causes. What then of the survivors, so many of them dragged, as it were into the iron realities of life, the product and under the conditions of semi-starvation, artificial feeding, intemperance, and hereditary constitutional weakness. A little higher up and nearer home we have the deteriorating tendency in the premature schooling by the parents of young children before seven, and the home tasks, which should be withheld until ten years of age, this premature schooling, through which in so many cases the blood which should go to build up the body is absorbed by the brain. The doctors might confirm this if we knew their statistics of these juvenile brain cases. I knew of a gentleman who, when shown the late Duke of Richmond's grand stud of horses, was astonished to find not a single blemish or spavin in any one of them; and the groom replied, "The Duke, Sir, never works a horse until six years old," a moral that points to many a parent who has sent the child to school instead of keeping it in the nursery.

And apart from the children it is well known that many a teacher has either succumbed altogether or has resigned and chosen some other vocation through overstrain and excess of mental work consequent upon the high standard set up.

Still higher up to the adult we have the lightning pace at which we are living; the rush and competition of everyday business, and in the mother country at least, the rapid modes of transit by rail.

Before I left England forty years ago many a note of warning was given by the doctors to the London merchants on the inevitable overstrain in having to focus all their business matters in time to catch the Brighton one hour 50-mile express at 5 o'clock.

In this, in all these, it is, it must be plus nerve strain minus stamina and physical strength.

And if these premises are correct may it not be found in the great future that we who prided ourselves on our greatness may have to take a lower place than those who lived in prehistoric times. Be it for us, therefore, to live up to our existing privileges, with a full realization of our great responsibilities.

PLATE 1.

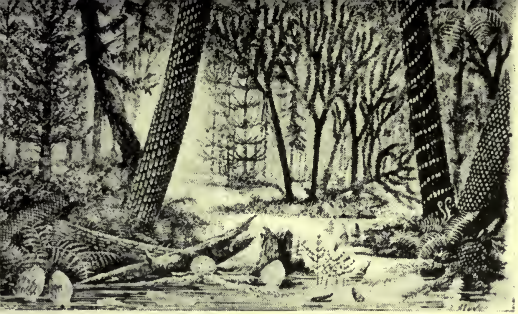


Fig. 1.

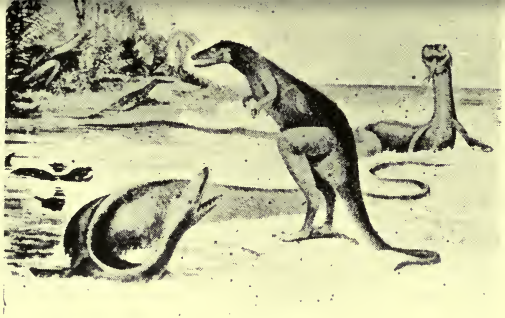


Fig. 2.

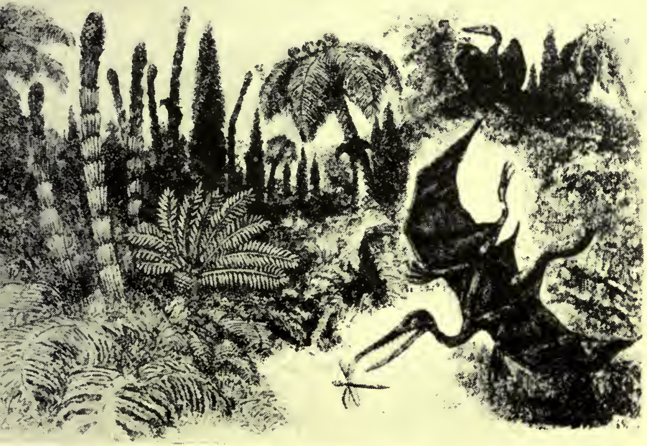


Fig. 3.

Fig. 4.

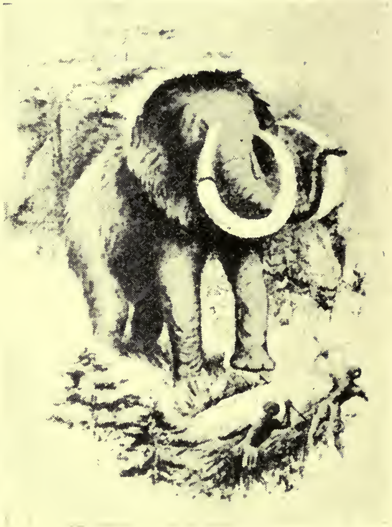


Fig. 5.

PLATE 2.

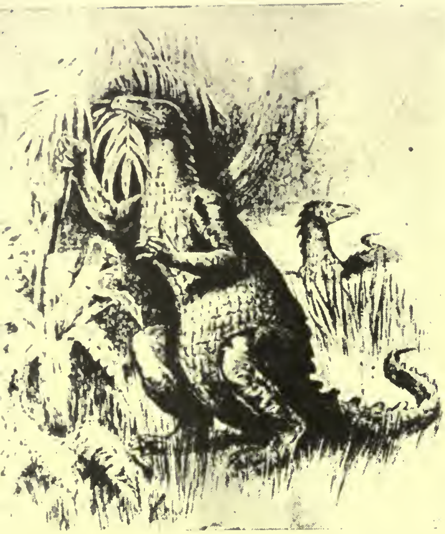


Fig. 1.

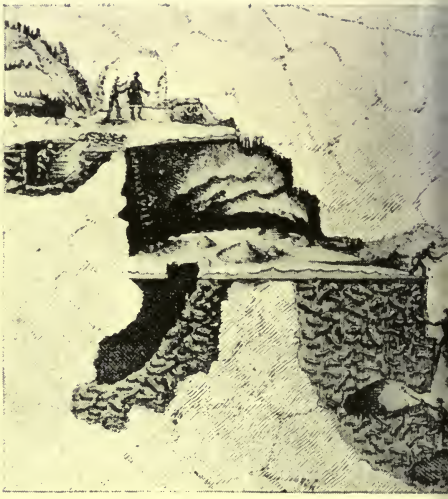


Fig. 2.

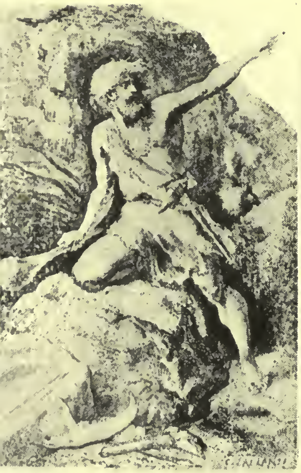


Fig. 3.

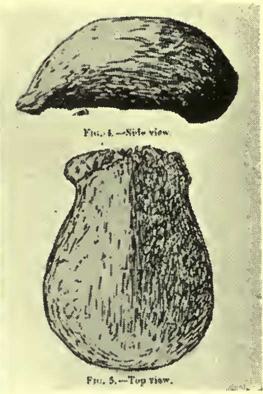


Fig. 4.—Side view.
Fig. 5.—Top view.

Fig. 4.

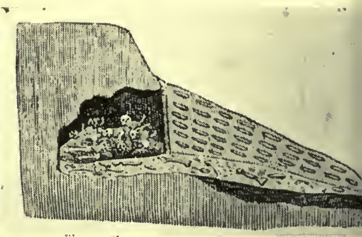
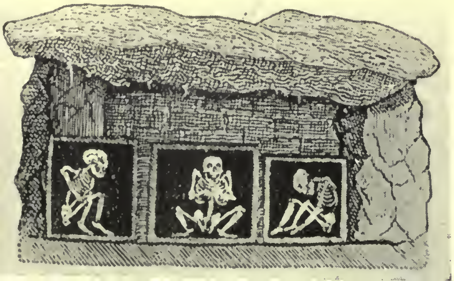
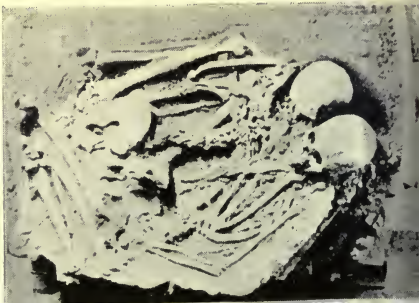


Fig. 5.





Extract from "Sydney Morning Herald," October 5, 1907.

Australian Pioneers following Flinders and Brown.

By J. H. Maiden, F.L.S.

At the beginning of the year the Science Congress assembled in Adelaide, and the South Australian Government, at the close of the Congress, placed the steamer Governor Musgrave at the service of sixteen naturalists from the various States, to enable them to visit Kangaroo Island and Spencer's Gulf, touching at the islands which the ordinary steamers never visit. I was thus able to realise a wish of many years to botanise at spots where the celebrated Robert Brown collected when he was with Flinders in the Investigator in 1802.

It is a matter of history that in 1800 the British Government decided to continue the exploration of coastal Australia, and, having set apart a small warship for the purpose, entrusted, after the fashion of the time, the appointment of the commander and of the scientific staff to Sir Joseph Banks. His appointees included Flinders, one of the most brilliant navigators who ever sailed in Australian seas; Robert Brown, who laid the foundations of Australian botany, and who has never been surpassed in any age in the importance of his botanical work; Ferdinand Bauer, the leading botanical draftsman of his time, and his high standard of work has probably never been exceeded.

So much is written in regard to Australia in an apologetic strain, that it is a pleasure to do a whoop now and then, and I challenge anybody anywhere to prove that the superlatives employed in describing the work of these three men are exaggerated. And they were appointed by Banks. Flinders, cruelly detained by General de Caen at the Mauritius, returned to England to die on the day of publication of his monumental work, "Terra Australis," in 1814. Brown and Bauer were transferred from the pay-sheet of the Admiralty to that of Banks for the remainder of their lives, for when Banks died they were provided with handsome annuities under his will.

Returning to the Governor Musgrave party, the scientific passengers were able to make observations where these men trod or observed, and to bring back collections which had especial value for that reason. We cannot, for example, all possess identical specimens collected by Brown, but we may visit Brownian localities and pluck twigs from the same kinds of trees and shrubs, and perhaps from the identical trees visited by him.

We called at Kangaroo Island. Hog Bay is sacred to the memory of both Flinders and Baudin, the commanders of the British and French expeditions which independently discovered Kangaroo Island within a brief period of each other. Flinders has priority, and there is a monument (cairn) at Kangaroo Head close by where he named the island, because of the animals, then so plentiful, which provided his debilitated crew with a meal of fresh meat.

In Hog Bay itself is what is known as Frenchman's Rock, a stratified mass, on which are rudely carved particulars of the French expedition by the hands of the boatswain, who was superintending the filling of the water casks. This rock was becoming weathered and injured, and a short time ago the South Australian Government protected it from further harm by enclosing it in a domed structure of Portland cement, with iron bars in front, permitting inspection.

We then proceeded to Kingscote, and from these two places collected specimens which have been compared with a number collected by Brown in 1802, and which I secured for New South Wales some years ago. The botanist of Baudin's Expedition was Leschenault de la Tour, and I have few—a very few—of his specimens also; but I have seen a large number of his plants in Paris, and the Director of the French National Herbarium was so kind as to send to me in Sydney a good many of them for special study in the year 1901. It is very important that Australian botanists should be familiar with the early Australian collections, but alas, most of them are in Europe, and many of us can only go to Europe once in a lifetime.

These South Australian collections are specially interesting to New South Wales botanists from the fact that they help us to follow generalisations when we know the southern plants used for study by Brown.

Leaving Kangaroo Island we made for a number of islands named by Flinders, and which are not visited by trading vessels. We landed on South Neptune, Williams and Thistle Islands. Here we are off Cape Catastrophe, where Flinders lost eight of his crew, who had gone to fill the water-casks a short distance from the ship, when neither boat nor crew was seen again. The occupants of the boat included Messrs. Thistle (master), and William Taylor (midshipman), and their names were perpetuated by islands in Spencer's Gulf. The sad accident was commemorated by the bold Cape Catastrophe, and, very touchingly I think, by the name Memory Cove, given to a pretty little bay which we visited. Here Flinders tells us he erected a memorial, and a portion of the plate was discovered many years afterwards, and is now carefully preserved in Adelaide. Some years since the South Australian Government placed, at the head of the cove, a substantial plate commemorating Flinders and his lost boat's crew. The local Geographical Society, assisted by private and Government contributions, erected a plate, let into a large boulder, at Encounter Bay, so named by Flinders because he here encountered the French Expedition. There is also a monument to Flinders at Mount Lofty, on the hills behind Adelaide. An important Adelaide street is named after this great man, while the name is largely used for commemorative purposes in the southern State. No one can, therefore accuse South Australia of neglecting the memory of the intrepid Flinders, and there is no doubt that before long the mother State will equally honour Banks, Flinders's warm-hearted patron, so long identified with New South Wales.

We also visited the Sir Joseph Banks group of islands, landing on the largest of them, Reevesby Island, named by Flinders after Reevesby Abbey in Lincolnshire, Banks's country seat. At all these places we carefully collected and preserved specimens, and notes were made of the botany, zoology, and geology by different hands.

But the most interesting place of all was left to the last—Port Lincoln, so named by Flinders after the county town of both Banks and himself. The port forms a fine harbour, protected by a picturesque island called Boston Island. Near Port Lincoln is a remarkable conical hill called Stamford Hill, one of the most prominent objects in the landscape. Here Sir John Franklin then Governor of Van Diemen's Land, who served as a midshipman under Flinders, erected a noble obelisk to his memory. Here, therefore, we have an additional Flinders Monument. The whole district is botanically very interesting, and because of the irregularity of the coastline Flinders spent a good deal of time hereabouts charting it. This gave Brown the opportunities he wanted to make a fine collection of plants. With Flinders' work and maps before me, I followed Brown's tracks of more than a century before, and believe that I scarcely missed a plant that Brown is recorded to have collected there. And then I did what Brown did—brought them to Port Jackson, and carefully compared them with New South Wales forms. To fully understand Brown's Australian work, one must visit South Australia, and especially Port Lincoln. Flinders discovered the South Australian coastline, and the South Australian coastline (omitting a little of southern Western Australia) was the first part of this continent where Brown botanised. One can readily imagine that South Australia henceforward had a very warm place in his heart.

Port Jackson he worked even more thoroughly, and we know some of his botanical haunts in the Sydney district. It is beyond the scope of this little sketch to further trace the track of Flinders and Brown, but I would like to emphasise one point. Australian history and geography may be studied from many points of view. Those who have a penchant for Australian history, for example, may specialise. One student may take biography, another land grants, another churches and matters ecclesiastical, another the development of the wool industry, another windmills, and so on. But while a commendable amount of interest has been taken in the collection of books, maps, and documents generally, the historical aspect of Australian botany has been largely overlooked. Botanists are aware that the collection of specimens from the tracks of the early explorers (not merely the botanical explorers) are not of sentimental interest merely; they are absolutely essential for a proper study of Australian plants, and the sooner we systematically begin this study the better, for every day we are passing further from the period when the specimens were originally collected, and specific localities are becoming effaced botanically. To give two instances. Over 20 years ago, seeing that Mosman was beginning to attract population, I assiduously collected there. Brown collected there! When the Illawarra line was opened, for months, at weekly intervals, I made it my business to get out at different stations as far as George's River, and preserved specimens from localities which are now densely built over. And who can foretell the progress of these localities during the next half-century? Brown (to mention no later botanists) collected there. Let us get on the tracks of good men whenever we can, and emulate their good deeds.

Australia 200 Years Ago.

(Two extracts from Mott's "Compleat Geographer, 1709.")

The SOUTHERN UNKNOWN REGION, or TERRA AUSTRALIS INCOGNITA, is a vast Tract of Land, as we judge by the Coasts. I have distinguish'd the Parts of it by the several Names given it by Pilots and Captains, and who have sail'd, by them. The Inhabitants are white, of a large Stature, strong, industrious and courageous; it is very sad to fall into their Hands, as some Europeans have found by unhappy Experience. Some modern Relations tell us, That in all that vast Country they have neither King nor Prince, all the people are only combin'd together in several Factions, in the Form of a Commonwealth. They chuse Governours only to make the Lazy work, punish Offenders, and render Justice to every man. They are Idolaters, and have Oratories to pray to their Idols in. They observe certain fasts, and Wash their Bodies on certain Days every Year.

The Country of NEW ZEALAND is Antipodes to France; the Dutch, in the Year 1642, were used cruelly by the Men they found there of an extraordinary Stature. Fernando de Quiros, who spent 14 Years in these Voyages, discover'd it before those Republicans. He was fourteen Months at the Court of the King of Spain, to persuade his Catholick Majesty by eight several Petitions, to send Colonies thither; and represented a thousand Advantages that would arise to them by the Extent of it, Fruitfulness, People, and Conveniency of the Ports, but was not regarded. It is placed in the Dutch Maps between the 34 and 44 Degr. of South Latitude, and between the 189 and 194 Degr. of Longitude.

VAN DIEMEN'S LAND is situated farther Westward, between the 163 and 169 Degr. of Longitude; and between the 41 and 44 Degr. of Southern Latitude. This Country was first discover'd Novemb. 24 A.D. 1642, by Abel Tasman a Hollander, who impos'd on it that Name in Honour of Anthony van Diemens, Governour of the Dutch East-India Company, whence it is also termed, The Country of Anthony van Diemens. But 'tis not known, whether it be an Island, or a Continent; in regard that its Northern Coast only was descry'd, with Frederick'-Henry's Bay, &c.

The other Parts of Terra Australis lie farther Northward, and follow in their Order.

New Holland is wash'd on the North, by the Seas of the Molucca's and Anchidol, and on the West and South by the Indian Ocean. Its Sea-Coasts were discover'd by the Hollanders, above Fifty Years ago; and its Bounds are usually set out in the Maps, between the 12 and 35 Degrees of Southern Latitude, and between the 134 and the 169 Degr. of Longitude. This Country is divided into several Parts, viz., Peter Nuitz's Land, which derives its Name from its first Discoverer, who arriv'd on those Coasts A.D. 1625; Het Lands van Lewinnen, or The Lioness Island; The Land of Concord; in Dutch, t' Landt van Eendracht, accidentally found out, and so nam'd by the Hollanders, as they were making a Voyage to the Molucca's A.D. 1618, the Countries of Edels, Du-Wit, and Arnent.

Carpentaria, or Carpenter's Land, owes its Denomination to one Carpenter, a Dutch Commander, who first made a discovery of its Coasts, and is remarkable for its situation between New Holland and New Guinea, in the innermost part of the Indian Ocean.

La Tierra Austral Del Esperitu Santo, *i.e.*, The Southern Country of the Holy Ghost, a large Tract of Terra Australis, in the Southern part of the Pacifick Sea, was first found out and so call'd, by Peter Ferdinand de Quiros, in the Name of Philip III., King of Spain, A.D. 1606. It is extended very far from the North-west to the South-east, and to 15 or 16 Deg. of Southern Latitude. It contains the Harbours of S. Felippe, S. Jago, and Vera Cruz, near the Rivers Jordan and S. Salvador, and many Islands lie over against its Northern Coast, according to the Relation of John de Turrecremata, in the Voyage of the said Ferdinand Quiros. M. Sanson places this Country on the South-east of New Guinea, and on the North of it the Islands of Solomon, but both are omitted in the Dutch Maps. Jacob le Mayre took the Island of Good Fortune, and the Horn-Isles, which he discover'd in his Voyage to New Guinea, for those of Solomon, because he found them to agree with Ferdinand Quiros's Description. Others make the Number of Solomon's Islands to amount to 20, but their Names are scarce known, neither are they inhabited by any European Colony. The chief of them are, S. Isabella, which is of a larger extent than the rest, Guadalcanale and S. Nicholo. Anthony of Leon informs us, that the Spaniards made three several Discoveries of these Islands, viz. The first by Alvarez de Mendana, A.D. 1567, the second by the same Alvarez, in 1599, who was then accompanied by Peter Ferdinand de Quiros, and died there, and the third by the same Ferdinand de Quiros, in 1605.

We have but lightly touch'd upon the Parts of Terra Australis, in regard that its Sea-coasts only were discover'd by the Hollanders about 50 years ago, but the Nature of the inland Country, is altogether unknown to them, as well as to the rest of the European Nations.

Neither indeed can much more be deliver'd, concerning a great number of Islands of the Pacifick Sea, which are but of small compass, and were only discover'd accidentally upon several Occasions. Those that lie on the North of the Equinoctial Line, were discover'd and nam'd by the Spaniards, as they were sailing from America, to the Ladrones and the Phillippines. But those that appear on the South of the same Line, were found out, for the most part by Jacob le Mayre, and William Cornelius Schouten, and call'd by their Names, when after having pass'd the New Streight, they sailed from South America to New Guinea.

Time may possibly bring to Light as particular Accounts of all these Countries, as we now have of America, which was as much unknown to former Ages. But for the Present these Descriptions are as succinct as are to be had, or at least as good as needs of Countries which are never travell'd to, nor from which any thing is brought for our use. And with them we shall close our Description, which we hope has answer'd the Reader's Expectation. We heartily wish him as much Pleasure and Profit in reading it, as we have had Care and Pains in composing it, and then I am sure we shall both be pleased.

The Antarctic Country 200 Years Ago.

These Countries are call'd ANTARCTICK from the Pole of that Name, near which they lie; they are also call'd Southern, because of their Situation. The Dutch-Relations pretend, that they are not less than America, and as Fruitful and well Peopled as Europe. They reach not farther than the Sixtieth Degree of Southern Latitude. Magellan, who discover'd them first, gave them the Name of Magellanica.

The air is very different, according to the several Regions of it, but it is said, the Soil is generally fertile in all sorts of Fruit, wild and tame Beasts, some of which are unknown to us. Fernando Quiros the Spaniard, Mayre, Browers and Schonten, Dutchmen, observed several Mouths of Rivers, but durst not venture upon the Land; they only entered some Gulphs and commodious Havens. The Streight of Magellan, discover'd in 1520, is two hundred Leagues in length; and in some places two or three in other six or ten Leagues wide. Mayre's Streights, on the East of Terra del Fuogo, discover'd in 1615, is ten Leagues long, and as many wide. Brower's Streight, found out in 1643, is much like Mayre's. The English and Dutch go that Way sometimes to the East Indies; and Dampier chose rather to go this Way, and Coast the Terra del Fuogo, than venture thro' the Magellanick Streight; because of the difficulty of that Passage.

FORM No. 1.

The Royal Geographical Society of Australasia.

SOUTH AUSTRALIAN BRANCH.

CERTIFICATE OF A CANDIDATE FOR ELECTION.

Name ....

Qualification or Occupation ....

Address ....

being desirous of admission into the South Australian Branch of the ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, we, the undersigned members of the Society, propose and recommend him as a proper person to become a member thereof.

....

....

Dated this .... day of .... 190 .

Form of Legacy.

£ : :

I HEREBY BEQUEATH to the ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (South Australian Branch) the sum of

....

to be devoted to the objects of the Society; and the receipt of the Honorary Treasurer of the said Society shall be a sufficient discharge for same.

E.M. 5-6-67

G
51
R87
1906/07

Royal Geographical Society of Australasia. South Australian Branch
Proceedings

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY